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The CHEMICAL AGE

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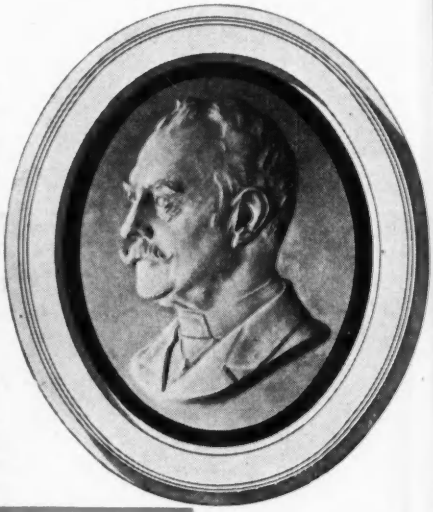

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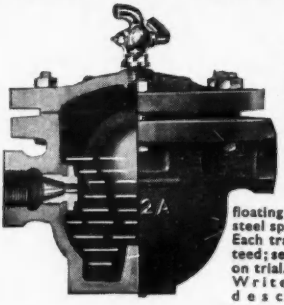

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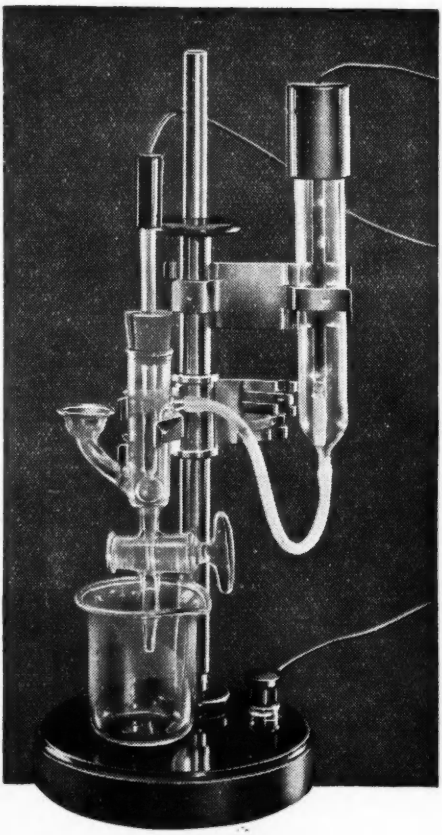

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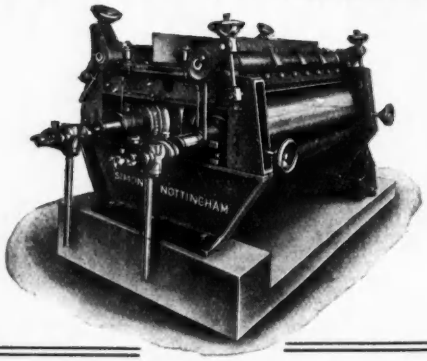

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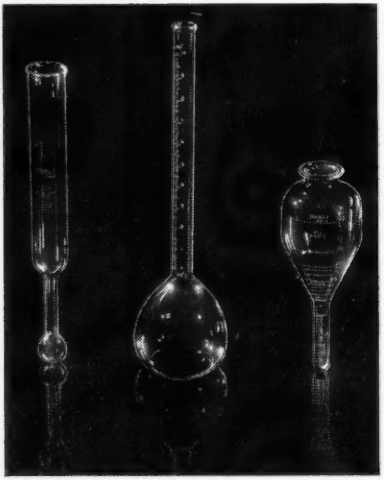

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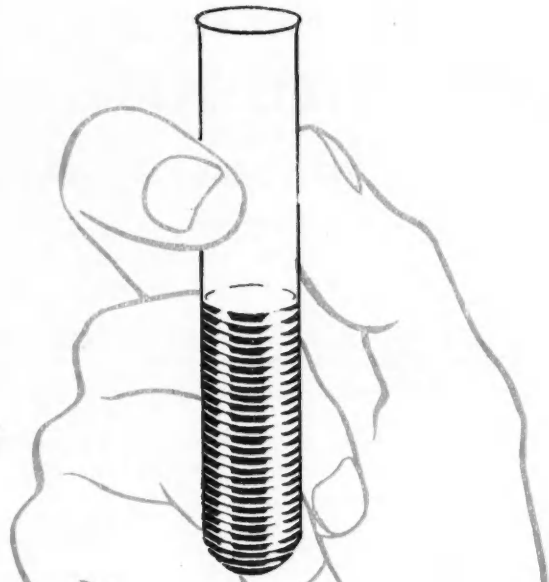

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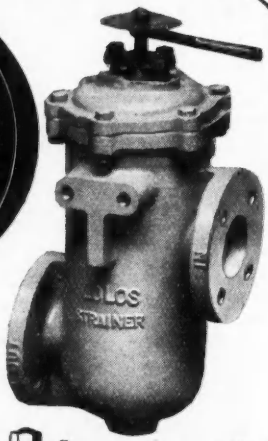

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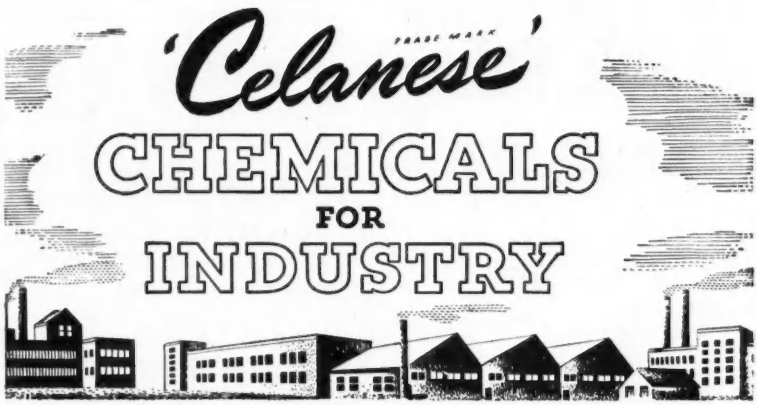

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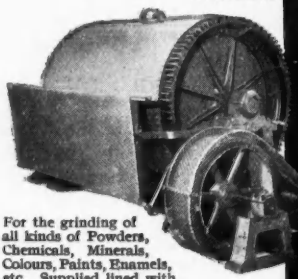

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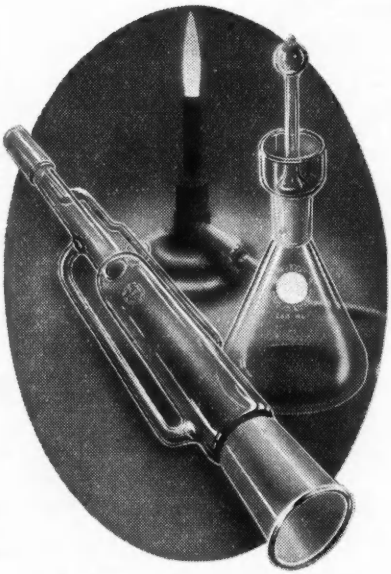

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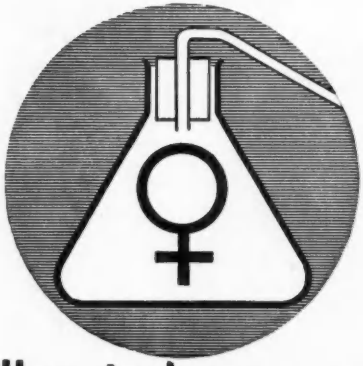

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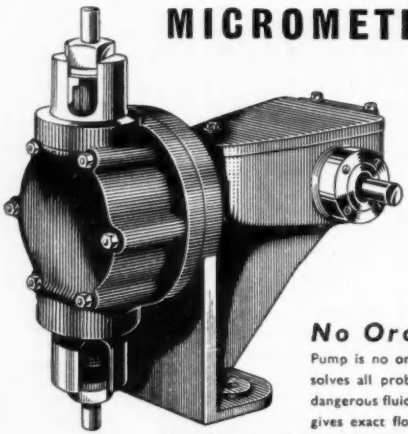

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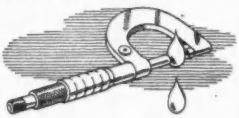

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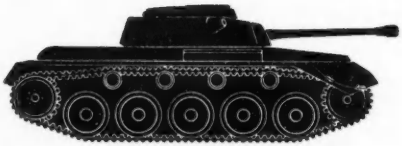

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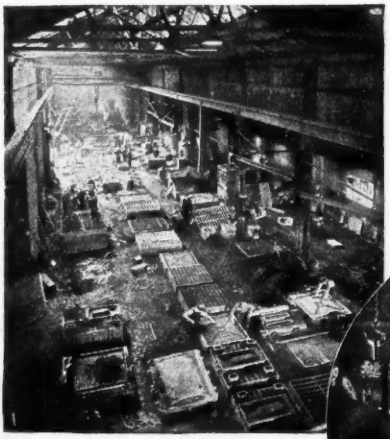

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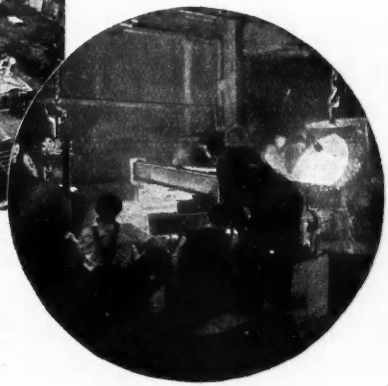

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Carbonisation and Chemicals

THE carbonising industries—coke ovens, gasworks, low temperature carbonisation—are the chief supports of our native organic chemical industry. The gases produced by carbonisation are used in a few places in this country and Europe for the production of chemicals. There is also the possibility of producing other chemicals by the development of ethylene recovery. In assessing these technical possibilities, due weight must now be given to the effect of nationalisation, not only on these industries but on those based on the products of carbonisation. Some assessment of future possibilities has been made in a recent paper to the Coke Oven Managers' Association, the Institute of Fuel and local district gas associations by Dr. G. E. Foxwell.*

The view has frequently be expressed that coke ovens should be developed principally as a chemical industry. The chances of using surplus gas for the manufacture of chemicals on a vast scale have been widely discussed. There appears to have been among chemists a disinclination to look with enthusiasm on the manufacture of fuel or power as a field for them. Dr. Foxwell has reminded the industries concerned that to-day the standard of living of any civilised nation depends on the amount of energy at the disposal of its population. "We can relate the wealth level of society directly to the availability of energy of the machines to manage this energy and of the know-how to operate them," said an American industrialist. It is not altogether surprising, therefore, that an industry or group of industries which collectively process 40 million tons of coal in order to convert 100 therms of raw coal into 80 therms of saleable energy should be regarded primarily as an "energy" industry.

Those facts, however, must not obscure the chemical possibilities of the main or subsidiary products of coal. The chances here of economic large-scale production of oil from coal at the moment are small. The influence of jet-propulsion on the quality of oil may change this position, and the growing scarcity of oil could, of course, so increase oil values that production from coal would become economic. The chemist will also do well to remember that an ash-free suspension of coal in oil may serve as a fuel for future "gas" turbines. The possibilities of the Fischer-Tropsch process as a producer of organic chemicals from coal have probably not yet been fully explored, and there remains the possibility that future research will enable this process to be used as the basis for extensions of our organic chemical industry, the oil being a by-product.

Of the possibilities of the direct production of chemicals from coal the working-up of existing and potential by-products is the most practical development. Dr. Foxwell sees no reason to change existing practice in the tar and benzol industries, although there is, as he points out, the danger that the nationalised industries—coal and gas—which control the raw materials could

*"The Carbonisation Industries After Nationalisation" by Dr. G. E. Foxwell, D.Sc., F. Inst. F., M.Inst. Gas E. M.I.Chem.E., etc.—*The Gas World.*

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withhold or divert supplies. That is an unpredictable risk, and the fact that such action would be unjustifiable does not render the contingency impossible

Ammonia is in a situation different from that of tar and benzol. The bulk of ammonia is converted into fertilisers, the market for which is dominated by synthetic production. The relatively low prices secured for by-product ammonia make profitable production difficult. A body as large as the NCB or the Gas Council might well find that the large-scale production rendered possible by bulk operations will provide the means to make ammonia profitable once again. The proposal identified with the name of the late Percy Parrish is well worthy of re-consideration. That envisaged the setting up of central plants in each region to which could be sent highly concentrated ammonia liquor for working up into various products, not exclusively fertilisers or sulphate of ammonit. The chemistry of ammonia has not yet been fully exploited on the industrial scale and it is a fair prospect that ammonia itself can serve as the starting point for other chemicals.

The possibilities of ethylene have been widely explored, and there is no doubt whatever that among coal chemicals it has the greatest possibilities as a raw material for chemical production. Dr. Foxwell, while fully recognising these possibilities, calls to mind, however, the vast programme of petroleum refining in this country and asks whether the carbonising industries have not "missed the boat." Already the petroleum industry is setting out to manufacture, largely from olefins, a wide variety of organic chemicals. As the market for these chemicals increases, the production of ethylene from coke ovens and even from gasworks may be found to be desirable.

There seem to be some doubts as to the economic desirability of producing ammonia or methanol from coke oven gas. It is exceedingly difficult to discover evidence of the price that can be paid for the gas. The price paid for coke oven gas for these purposes compares poorly with values as town gas.

The carbonising industries will continue to be a branch of the chemical industries, but it is evident that their future will be primarily that of fuel or energy-producing industries, at least for many years to come. The duties for consultation and co-operation that the various nationalisation Acts place upon them underline the anomaly that the Minister of Fuel and Power has neglected to place the NCB coke ovens and the gas industry under the control of the Gas Council. When one authority carbonises 10 million tons of coal and another 20 million tons and both supply coke and gas as their main product, not to put them both under one umbrella is inexplicable.

NOTES AND COMMENTS

Steel and Chemicals

THE presentation of the Iron and Steel Bill in the Commons, which according to present anticipations will take place on Monday, will signalise the attainment of a significant new phase in Government policy of monopoly control. While this measure is yet a Bill, and one fresh from the Parliamentary draftsmen, its purpose, if Government intentions are fulfilled next year, foreshadow changes in the conduct of industries more fundamental than its predecessors—coal, transport, gas and electricity. They by comparison were limited to specific industries and a few ancillaries traditionally within their sphere. If the projected Iron and Steel Corporation of Great Britain becomes a reality it will be obliged in directing its host of diverse subsidiaries to enter formidably into a dozen fields of productive industry in which Government participation and, inevitably, competition, have never before been seriously considered. Radio sets and tennis racquets have been mentioned as figuring among the incongruous interests which may now come within the scope of Government planning, for which this Bill is clearly intended to provide a foothold which could not fairly be won by direct attack. In that context it is now being prominently borne in mind that there are traditional bonds between chemicals and the iron and steel industry very much closer than those of the light engineering industries. (The Bill is reviewed on page 621.)

The New Inquisition

THE tightening stranglehold which international mistrust is applying to scientific exchange, and hence to the total rate of development, around the world is no novelty, but it sometimes appears that in liberal circles little is done except to deplore it. Many will accordingly have applauded the standpoint taken by Sir Henry Dale, past-president of the British Association, in his forthright presentation of the facts before the open meeting called last week-end by the Atomic Scientist's Association, at which the tendency apparent in some quarters to mistake the influence which has been responsible for most of the interruption of free communication was fairly well represented. The fact that some of the arguments in support of the latter viewpoint were supported by quotations from the Soviet Press did not add appreciably to their weight. In contrast, Sir Henry Dale's recognition that, since the suppresson by another faith of the intellectual leadership of Galileo, there has been no greater threat to free minds than that now active in the U.S.S.R. was a statement of fact which nearly all ascertainable evidence confirms. He revealed, incidentally, that he continues to receive from Hungary, where the purge of scientists on political grounds continues unabated, pathetic letters from scholars who have been made its victims. These and the modern " Inquisition " which is operating in the Moscow Academy of Sciences cannot be ignored by anyone who aspires to pass judgment on the causes of the chasm which is widening between scientists of different nations.

Report on Streptomycin

AS news accumulates of steady expansion of streptomycin production it is easy to overlook how relatively new is the antibiotic and to what extent its use is still being determined by clinical experiment. The reminder comes from a report just released by the committee which the Medical Research Council appointed two years ago to study the effectiveness of streptomycin in the treatment of pulmonary tuberculosis. For those who are not medical practitioners, the outstanding fact of this report on the response of 55 victims of acute progressive tuberculosis of both lungs is that it was unmistakably successful by common standards. The 55, between 15 and 30 years old, in seven widely separated centres, received 2 g. of streptomycin daily by intramuscular injection; other parallel cases, acting as controls, received identical treatment without streptomycin. After six months, 14 of the control group had died, while of the " streptomycin " cases only four had ended fatally. Considerable improvement was observed in 27 (51 per cent) of the patients who received the drug and in only four (8 per cent) of those who did not. After a full year's observation 12 of those who had

been treated with streptomycin had died and of the control group 24. Rather less marked, however, was the contrast in physical improvement between the two groups, 31 per cent of the control group showing improvement, as compared with 56 per cent of the " streptomycin " cases. The report, which Dr. Marc Daniels prepared, contains much more of direct interest to those concerned with the production of streptomycin as well as to medical men. It records, for example, that the toxic effects of this treatment, which have sometimes been serious, were never so marked as to require abandoning the treatment. But it warns again that the antibiotic has not effected a " cure " in any of these cases, and the problem presented by the rapid engendering of streptomycin-resistant bacilli is as serious as ever.

Atomic Mindedness

TO be able to hold the unwavering attention of an extremely mixed audience and to explain lucidly in less than one hour the scientific achievement of atomic energy is a task which few other than Prof. M. E. L. Oliphant would venture to undertake. He is one of the few experts able to come down to the level of the layman. One of the remarkable things about his lecture, the first of the series on " The Atomic Age " given at the Memorial Hall, Farringdon Street, E.C., under the auspices of the Sir Halley Stewart Trust, was the extraordinarly mixed composition of the audience, proving the widespread interest being taken in this subject by the public. This " atomic mindedness " shows that many people besides scientists and chemists are deeply concerned whether, as Prof. Oliphant said, radioactive energy is to be used by slow controlled release for the production o power to the benefit of mankind, or used violently, and catastrophically, in the form of the atom bomb.

What, No Fireworks ?

IT is by now common, not to say disappointing, knowledge that for a week or two prior to Guy Fawkes' Day it has been next to impossible for John Citizen, senior or junior, to purchase any fireworks. Many retailers might have amplified their laconic : " Sold out!" or " We didn't get many this year," with the all to familiar explanation that a large proportion of fireworks have joined the " export only " category. The fact that the *feu de joie* on Friday evening was but a raggard discharge was for once not entirely the responsibility of the chemical industry. One of the principal makers of pyrotechnics explained to THE CHEMICAL AGE that output nowadays is limited largely by inadequate paper supplies. Actually, manufacturers get a bonus allocation of paper in proportion to the quantities of fireworks they export, on the principle of " No exports, no paper for your home trade." This year's fireworks were all produced without undue strain on the chemical constituents, but now, after the event, there are indications that one of the chief components is becoming increasingly hard to get. That refers to potassium nitrate, the shortage of which is not caused by any falling away of production, but by the increasing quantities of KNO_3 used in vitreous enamelling —for export and fittings of " pre-fabs." One of the principal suppliers has, in fact, instituted a system of rationing.

WORLD TIN PACT?

THE International Tin Study Group at its meeting at the Hague has forwarded to the member Governments a report on the advisability of entering into an international tin agreement and inquired whether they would be willing to attend a conference to confirm it.

If this meets with sufficient support the Secretary General of the United Nations will be asked to convene such a conference next spring.

A compromise on price level between producers and consumers was eventually reached at the Hague discussions.

TECHNICAL SCHOLARSHIPS

TWO research scholarships, one in technical chemistry, the other in chemistry, have been offered by the British Coal Tar Research Association to the Royal Technical College, Glasgow.

The scholarships, which were announced at the annual meeting of the governors of the college, will have a value of £250 a year each, and there will be an additional sum of £225 for equipment and other expenses. There are now 5456 students at the college, compared with 3791 in 1938/39. Sir James French has been re-elected chairman of the board of governors.

Oil Refining

Scheduled Increase by 1952

A THREE-FOLD increase by the end of ERP in 1952 has been scheduled by the United Kingdom, which hopes to lift its oil refining capacity from the 7 million tons expected in 1949 to 21.3 million tons in 1952. In addition, the United Kingdom plans to increase her overseas refining capacity from 2 million tons in 1948 to 9.6 million tons in 1952.

With imports of more than 4 million tons of crude oil and petroleum products already authorised under ERP, Western European nations have been given a breathing space to permit them to restore and expand their own petroleum production capacity on a large scale. From the beginning of ERP on April 3 up to September 20, a total of $129.6 million worth of ECA—financed oil, petrol, lubricants and other petroleum products has been made available to nine European countries in danger of being seriously curtailed because of their shortage of dollars. $44 million to France, $44 million to the United Kingdom; $17.5 million to Italy and the rest to Denmark, Norway, Greece, the Netherlands, Western Germany and Austria.

NEW £4 M. OIL DOCK

A PROPOSAL to construct a new oil dock near the entrance to the canal at Eastham has been agreed by the directors of the Manchester Ship Canal Company and a Bill is to be promoted in the present session of Parliament seeking the necessary powers.

The dock will have an entrance lock approximately 800 ft. long and 100 ft. wide, and will accommodate tankers of 28-30,000 tons. The construction is expected to take about three years at an estimated cost of £4 millions.

Discharging facilities for cargoes of crude petroleum will be provided by the dock for the new refinery being constructed by the Shell group at Stanlow.

Reduced Metal Subsidies

A statement by the Financial Secretary of the Treasury (Mr. G. Hall) in the House of Commons on Monday indicated that ferro-chrome was the only department of the metal industries to receive an increased subsidy (£100,000) in 1948-49. Of the others, steel was receiving £3.250 million, against £7.918 million in 1947-48, magnesium nothing (against £107,000) and aluminium nothing (1947-48 nil; 1946-47 £953,100).

New Powder Technology

German Consultant in Scotland

THE Scottish Council (Development and Industry) has sponsored a visit to Scotland of Dr. Robert Meldau, a German scientist, who for a number of years has been making an extensive study of physical properties common to all powdered substances. By breaking down a variety of minerals and other substances to powder form, Dr. Meldau has already produced important results which indicate that even poor quality minerals can be of considerable value in the manufacture of substitutes for more expensive or scarcer products.

New Ceramic

Dr. Meldau attended a Press conference in Glasgow recently at the beginning of his three weeks' visit to Scotland, and gave practical illustrations of the steps which have been taken in this new department of powder technology by demonstrating a variety of coal ceramic which displays a high degree of resistance to heat, acid, atmospheric attack and is of sufficient structural strength to allow its use in certain forms of machine bearings. The Scottish Council has in mind its application to agricultural machinery.

Dr. Meldau pointed out that the same technique opened up interesting new fields in food treatment along lines quite different from normal dehydration, and he has with him samples of a vegetable meal produced by his new process which is of high sugar, protein and vitamin content, and which has already been used in Germany as a special food for miners.

Another allied process in which Dr Meldau is interested is that by which peat can be used as a substitute for wood and other scarcer materials in building. Although looking like stone, this new peat material in its present form is of sufficient strength only for internal purposes, but it forms an excellent interior wall with a high degree of noise insulation.

Dr. Meldau is consultant to the Ruhr mining industries and a lecturer on applied mineralogy at Munster University

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The Week's Coal Output.—Last week's total output of coal in Britain was 4,241,200 tons (4,035,800 tons deep mined, 205,400 tons opencast), compared with the slightly greater total in the previous week of 4,275,700 tons (4,045,300 tons deep-mined, 230,400 tons opencast). The cumulative output of deep-mined coal for the 43 weeks of this year was 161,379,100 tons, compared with 152,333,300 tons in the corresponding period last year.

New British Pharmacopœia is Launched

Substantial Changes Since 1932 Edition

THE lecture hall in Bloomsbury Square, London, of the Pharmaceutical Society of Great Britain was packed on October 28, when Dr. C. H. Hampshire, secretary of the British Pharmacopœia Commission, gave an interestesting address on this long-awaited 1948 edition of the British Pharmacopœia.

The last BP appeared in 1932 and it was intended to produce a revised edition every ten years. The next volume was, in fact, well under way at the outbreak of war, but it was impossible to complete it, and a series of six addenda was issued to keep as up to date as possible with the progress of medical knowledge.

New Additions

Dr. Hampshire explained the magnitude of the work, and the wide scope of the new volume, embracing the old drugs such as senna and oil of rosemary, to the modern chemotherapeutic drugs—sulphonamides and penicillin—and the hormones, injections and vitamins.

Boric acid ointment had been retained because of the public's confidence in it, the doctor said, although the boric acid content was so reduced as to be practically valueless; on the other hand, 11 crude vegetable drugs had been deleted as of insufficient clinical importance.

Another change was the substitution of weight per millilitre for specific gravity, except in the case of alcohols where it was retained to conform with statutory requirements.

When discussion and questions were invited, it was asked: what steps were being taken to put advance copies of the pharmacopœia into the hands of the manufacturer? At present, the questioner pointed out, any alterations and new regulations became effective immediately on publication of a new edition and, although advance copies could be consulted, they were extremely hard to come by.

Dr. Hampshire replied that it was hoped that as soon "as the Government could spare time from nationalising everything," conditions would be so amended that a specific period of time, perhaps three months from the date of publication, would be allowed before any changes came into effect.

The next speaker regretted that it had not been possible to decide on a uniformity of tablet sizes.

The possibility of dropping of Latin titles was raised, but Dr. Hampshire contended that Latin names were essential for international standards and nomenclature.

Some Omissions

Another speaker regretted the omission of the alkaloids of opium, considerably used to-day. The doctor replied that, while the commission endeavoured to include all the latest developments, this was one of several subjects under survey, but it was not completed in time.

It was noteworthy that practically all speakers agreed that the magnitude of the work and detailed investigation necessary had produced a volume well up to the established reputation of its predecessors

Synthetic Quartz Crystals From Powdered Silica

AMONG the new products and processes described in the September issue of *Chemical Industries* (New York) is the growth in steel "test tubes" by Bell Telephone Laboratories of quartz crystals identical with those produced by natural processes.

A clear crystal more than an inch long can be grown in a month, and owing to the controlled uniformity of production, they are stated to be superior to natural ones.

Natural quartz crystals and also the synthetic ones known as EDT (ethylene diamine tartrate) are widely used in telephone communication. Both real and synthetic are piezo-electric—able to convert mechanical energy to electrical energy or *vice versa*. When electrical current is applied to them they vibrate at certain specific frequencies.

Quartz is also used extensively in maintaining frequency standards in radio.

The synthetic crystals are grown from a finely powdered form of silicon. This is placed in the bottom of the steel "bomb" and an aqueous alkaline solution is added. The seed plate, a thin wafer of quartz, is suspended at the top of the vessel, which is then sealed and placed in a furnace.

Submitted to pressures exceeding 15,000 lb. p.s.i. at temperatures of about 750°F. the silica dissolves. In its dissolved state it rises to the cooler part of the bomb and is deposited on the seed plate, in perfectly regular order until all is in the form of a single clear crystal.

SULPHURIC ACID PRODUCTION

Small Reduction in July-September

THE three-monthly classified summary issued by the National Sulphuric Acid Association reveals a small general reduction in the period July-September, 1948. The total quantity of acid produced during the quarter was 382,741 tons compared with 398,744 tons in the period April-June.

SULPHURIC ACID AND OLEUM
Tons of 100% H_2SO_4

	Chamber only	Contact only	Chamber and Contact
Stock July 1, 1948	32,451	27,131	59,582
Production ...	171,440	211,301	382,741
Receipts	38,758	28,619	67,377
Oleum feed ...	—	2,947	2,947
Adjustments ...	−12	−3	−15
Use	98,448	79,571	178,019
Despatches... ...	111,668	159,374	271,042
Stock Sept. 30, 1948	32,521	31,050	63,571
Total capacity represented ...	216,270	223,300	439,570
Percentage production	79.3%	94.6%	87.1%

RAW MATERIALS
Tons

	Pyrites*	Spent Oxide	Sulphur and H S	Zinc Concentrates
Stock July 1, 1948	71,551	167,146	80,740	24,870
Receipts	64,805	56,582	51,566	30,219
Adjustments ...	+1,041	−7,462	−112	−215
Use	74,616	49,678	64,147	41,467
Despatches ...	2 41†	4,435 269†	53	—
Stock Sept. 30, 1948	62,738	161,884	67,994	13,407

* "Receipts" and "Use" include Anhydrite "converted" to Pyrites.
† Used at works for purposes other than Sulphuric Acid manufacture.

CONSUMPTION OF SULPHURIC ACID AND OLEUM
UNITED KINGDOM AND EIRE
July 1, 1948, to September 30, 1948

TRADES	Tons 100% H_2SO_4
Accumulators	2,344
Agricultural purposes	9,790

Quantities delivered were slightly less. Of consumption, the total was 383,380 tons compared with 406,879 tons, but in individual items phosphate (industrial) and rayon and transparent paper showed an upward trend.

The list given here reproduces the figures of the survey.

	Tons
Bichromate and chromic acid	2,600
Borax and boracic acid ("Unclassified")	
Bromine	1,799
Chlorsulphonic acid ("Unclassified")	
Clays (Fuller's earth, etc.)	1,961
Copper pickling	639
Dealers	4,393
Drugs and fine chemicals	2,432
Dyestuffs and intermediates	19,171
Explosives	3,098
Export	922
Formic acid ("Unclassified")	
Glue, gelatine and size	324
Hydrochloric acid	15,471
Hydrofluoric acid	1,999
Iron pickling (incl. tin plate)	20,258
Leather	1,621
Metal extraction	318
Oil (mineral) refining	10,398
Oil (vegetable) refining	2,016
Oxalic, tartaric and citric acid	1,963
Paint and Lithopone	17,400
Paper, etc.	988
Phosphates (industrial)	1,322
Plastics, not otherwise classified	2,678
Rare earths	605
Rayon and transparent paper	37,648
Sewage	2,632
Soap and glycerine	1,017
Sugar refining	170
Sulphate of alumina ("Unclassified")	
Sulphate of ammonia	60,523
Sulphate of barium	1,288
Sulphate of copper	2,086
Sulphate of magnesium	1,603
Sulphate of zinc	635
Superphosphates	110,296
Tar and benzol	4,278
Textiles	5,709
Unclassified—Uses known	18,409
Uses unknown	10,576
Total	383,380

Britain Supplies Latest Margarine Plant to Italy

A COMPLETE margarine production plant is to be shipped from England to an Italian firm in Verona. The undertaking is being carried out with the approval of the Italian Government and is considered of national importance in the country's rehabilitation plans.

The plant will be supplied by Bamag, Ltd., of London, and will incorporate all modern practice. It is designed to refine the oil by a semi-continuous process reducing loss to a minimum, and hardening will be effected by the nickel formate process, hydrogen being supplied from a Bamag electrolyser. The hardened oil is then filtered, post-refined, and finely deodorised at high temperature and a vacuum of less than 8 mm. Hg. After the oil is cooled and put through the polishing press it will be stored in a number of tanks according to its characteristics.

These various oils and fats are to be weighed, mixed, and emulsified with fresh milk prepared in a specially designed milk ripening equipment and chilled over a margarine drum. In another part of the plant the material will be continuously kneaded and packed automatically into bricks of 100, 250, and 500 grammes at the rate of 70 bricks a minute.

The factory will also comprise a laboratory which will include the pilot-size Bamag Express hydrogenator.

The Assault on Scientific Freedom

Sir Henry Dale on Lost Ideals

SIR HENRY DALE was the principal speaker at the evening session which formed part of the open meeting sponsored by the Atomic Scientists' Association at Beaver Hall, Garlick Hill, E.C.4, on Saturday (October 30).

The theme for discussion was the necessity for free interchange of scientific ideas and discoveries between nations, and the danger that the secrecy unavoidably imposed on certain military aspects of atomic energy and nuclear research might spread to other departments of science and chemistry.

Sharing Knowledge

Sir Henry Dale, who seemed at times to be representing a minority view regarding the causes of deterioration of scientific relations, pointed out that a community of scientists who believed in exchanging and sharing their views had formerly existed for centuries. Even wars had left little division among them and he quoted the example of Henry Davy being fêted in Paris even when we were at war with France.

There was an international congress in 1907, but the outbreak of war in 1914 brought the first serious setback to free exchange of ideas.

After the 1914-18 war, Sir Henry continued, a larger part of science remained secret than ever before, but the main current remained free and it was essential that it should do so, for science was the most completely international of all man's intellectual activities. This was an ideal which ought on no account to be relinquished. At present we were being forced very far from it. Liberty was still the most important subject of corporate human action.

We must remain alert and watchful against encroachment upon scientific freedom and to ensure that military application was not allowed to hinder progress.

Work was still in progress on the potential use of bacteriology and chemistry in warfare, but no one suggested that bacteriologists or chemists should be restrained—they come and go freely, and so should those working on atomic energy. The atomic scientist must be punctiliously loyal, and there could then be no reason why he should be hampered.

"I believe," stated Sir Henry, "that the only effective prevention of war is the complete abolition of all military secrecy, but it is no use this coming from one side or one country only."

Purge in Hungary

The worst threat to freedom to-day came from the U.S.S.R. where there was enforced conformity by terror to a political creed. There had been nothing like it, Sir Henry declared, since the cardinals bullied Galileo into recanting. He had received and was continuing to receive pathetic letters from Hungary where there was a drastic purge in progress, and scholars were in danger of dismissal for political opinions. The speaker also cited recent evidence of coercion of scientists in Moscow.

We must, he concluded, try to meet the genuine scientists so long as it did not affect them adversely, and we must beware of those who were political time servers, and above all remain watchful and ready to stand against any attempt to let science fall victim to political turpitude.

ROLE OF TECHNOLOGY

THE necessity for a great increase in the technical knowledge of young men in industry was emphasised by Sir Edward Appleton, secretary of the Department of Scientific and Industrial Research in his address at the annual dinner of the Staffordshire Iron and Steel Institute at Wolverhampton. Britain, he said, was still pre-eminent in research, but this was of no value unless the potentialities and results from it were fully and rapidly understood and the results applied.

Practical training in technical colleges should be supported by local industry, he urged, and technical training to be useful must be linked with research.

ENGINEERING RESEARCH

A NON profit-making organisation, jointly financed by industry and the Government, the Production Engineering Research Association has been opened at Staveley Lodge, Melton Mowbray. The objects of the association, which is under the presidency of Lord Riverdale, are to discover improvements in methods of production and ensure their prompt and effective application. Opening the association's new laboratories, Sir Geoffrey Heyworth, chairman of the advisory council of the Department of Scientific and Industrial Research, declared that technical progress in England was dependent on the skill and prompt application of research results.

SAFEGUARDS IN INDUSTRIAL CHEMISTRY

Many Interests Collaborate at Harrogate Conference

SOME 200 delegates, most of whom hold executive posts in chemical manufacturing concerns throughout the country, attended a conference on accident prevention in chemical works, held at the Grand Hotel, Harrogate, from Friday to Sunday, last week. The conference was sponsored by the Association of British Chemical Manufacturers and was organised on its behalf by the Royal Society for the Prevention of Accidents.

Sir Harold West (Newton Chambers and Co., Ltd.), presided at the opening session on Friday evening, which was addressed by Sir Ewart Smith, technical director of I.C.I., Ltd. Also present were Sir Harry Jephcott (chairman of council, ABCM), Mr. J. Davidson Pratt (director and secretary, ABCM), who presided during subsequent sessions, Mr. H. R. Payne (chairman of the association's works safety committee), who took charge of a brains trust on Sunday morning, Mr. G. P. Barnett (H.M. chief inspector of Factories), and Mr. H. G. Winbolt (director, industrial safety division, Royal Society for the Prevention of Accidents).

A point made by Sir Harold West at the opening session was that the worst way in which to attract worth-while men to the industry was to say that the work was safe. The operative word, in his view, was not "safety"; for recruitment it was better to emphasise that there was an element of excitement, opportunities for the display of resource and courage, with, of course, the assurance that management was concerned about their welfare. The main objective of the conference was to prove that managements knew how to handle the problem and were not working "by guess or by God."

Too Negative

Sir Ewart Smith, who during the war was chief engineer and superintendent of Armament design in the Ministry of Supply, in his address, confirmed that the old cry of "safety first" was negative and wrong. He preferred the positive approach.

Accident prevention afforded a measure of industrial efficiency; the good factory, the safe factory, was clearly one in which the man was put before the machine, and the machine was not allowed to be master of the man.

We had, of course, to look at the problem of safety and accident prevention in proportion as well as in detail; the chemical industry was not, by ordinary standards, a terribly dangerous one. He mentioned cases in which the accident frequency rate was appreciably lower in high-pressure than in low-pressure chemical processes, the reason being that the designers, operators and maintainers of the plant appreciated the potential dangers and guarded against them.

The Safety Officer

Sir Ewart gave highest praise to safety officers, for, he said, they constituted a most essential and important part of the organisation. But the prevention of accidents and the control of conditions in the works was the direct responsibility of management at all stages, from the chairman or managing director down through the works manager, the plant managers, sectional managers, foremen, charge-hands and leading hands, and the workmen themselves were not excluded.

The safety officer's functions were as the adviser and the specialist, who educated people, sold his ideas, was critical, with an independent eye on what was done, whether in connection with design or in operation of plant or processes.

The human psychological approach to the problem could be tremendously helpful and could have results out of all proportion to the efforts expended on it. If they conducted their safety campaigns as something to which they were driven by legislation or, even by feelings of humanity, because they did not like to see a man carried away on a stretcher, that in itself would not bring out the whole-hearted confidence and co-operation of the workers.

If the worker really felt that they had his interests at heart, if they took him into their confidence, explained what the situation demanded and what had to be done to meet it, then the effort expended in so doing, the right psychological background, would have a most important effect. He doubted whether managements learned as much as they might through the eyes of their workers.

The provision of a safety organisation for safety did not mean that the management had to employ a lot more people. It meant that, where a factory unit was large enough, there should certainly be a whole-time safety officer, and if it were smaller there

should be a part-time safety officer, an advisory specialist keeping a particular eye on the safety aspect.

It should mean that there would be safety conditions, an organisation for educating all concerned, the management and the men, in organised safety and other relevant subjects. He believed that, with the growing complexity of industrial life, we had to devote a greater proportion of our time and effort to training. That rule applied to safety also. He referred to a large organisation abroad which reckoned that every man there—and there were tens of thousands—spent 20 minutes per week on safety training or inspection of some sort. The management were hard-headed people, but that practice was what the situation demanded.

Previous Attempt

Mr. J. Davidson Pratt referred to an organisation known before the war as a Committee on Solvents, which had collected information on various solvents, some of which had been thought to be safe but were in fact dangerous toxic agents. The work had had to go into abeyance; but immediately after the war he had pressed the Medical Research Council very strongly to revive its activities.

More than a year ago they had set up a Toxicology Committee, which was now getting into its stride, and which should be prepared to have investigated the properties of new compounds which might come into use or potential use and where the firms making it had not the facilities for the work themselves. Associated with that, the Medical Research Council's Toxicology Unit was prepared to undertake work of that sort, although facilities were limited.

The first thing we had to do was to know thoroughly the properties of the compounds, and then the chemical engineers were quite capable of designing plants and processes, to ensure that those compounds could be handled with complete safety. The chief danger tended to arise in using industries which were perhaps not quite so safety minded.

Mr. Davidson Pratt also emphasised the importance of the proper investigation of near accidents, from which we could learn a great deal to prevent accidents arising from similar circumstances later.

In the course of discussion a question was asked as to the wisdom or practicability of offering awards to workers having records of freedom from accidents. Sir Ewart Smith's first reaction to the question was that it was the duty of every workman and every staff man to avoid accidents; it was a duty to his fellows. To offer a reward for freedom from accidents would appear to be grandmotherly. What could be done when a man left a bucket in a gangway, for instance, and someone else fell over it and was injured? Who would lose the bonus? It seemed that such a scheme would be difficult and he felt also that it was a wrong approach to offer a bonus for something negative.

The speaker who had raised the question said he had had in mind also some form of penalty, of laying the blame at the door of the person responsible for an accident.

A subsequent speaker referred to a case in which awards had been offered for freedom from accidents, and said that the accident frequency rate was not reduced.

At the conclusion of the proceedings on Sunday the delegates agreed that the success of the conference justified organising another on other subjects in about a year's time.

The Influence of Chemical Plant Design

MR. J. E. BRAHAM (I.C.I., Ltd.), in his paper on "Some Aspects of Chemical Plant Design," said industrial accidents had been variously classified, and as an introduction to the present paper it might be expected that data would be presented in a form to show that the majority of accidents could be prevented by correct design of plant and buildings, design in the widest sense, including layout, painting, lighting, ventilation and other related matters. Although it was, of course, true that very many accidents were due to faulty design, such an approach to the subject of this paper would break little, if any, new ground, and would therefore have little chance of making any contribution of real value to the problem of industrial accident prevention. It was rather the intention to present some suggestions for a rational approach to the organisational problem of ensuring that during the design phase everything possible was done to ensure the safety of the personnel who would later have to construct, erect, operate and maintain a plant or factory.

It was seldom that much can be done in the laboratory to minimise the problems of the engineering designer, said Mr. Braham, but in some cases changes, such as, for example, a change of chemical route, could be found which made a valuable contribution. What was important was that the full implications of the chemical process should be realised at as early a stage as possible, and that the safety, medical and operating

department should be consulted before the details of the process were finalised. It was not suggested that the development of a chemical process should be determined by medical, safety and operating considerations, but that the chemist should realise the problems he was creating, so that he could make his contribution to ensuring that no avoidable difficulties should be passed on to the engineering designer.

As soon as the chemical process had been sufficiently developed for design of plant to commence, continued the speaker, a fully detailed chemical or technical flowsheet should be prepared. It was not sufficient that this flowsheet should merely set out the substances to be used in the process and the pressures and temperatures involved, but that it should provide as much information as possible on such factors as solidification temperature, boiling point, disintegration temperature or flash point of liquors, ignition conditions for gases and their toxicity, air-dust explosive concentrations for solids which have to be subjected to comminution and the effect on the skin of gases, liquids and solids used in the chemical process. The most certain method of dealing with these various issues was to prepare a questionnaire. The precise form and scope of this must naturally be determined by the general nature of the chemical industry involved, but it was not difficult to produce one which, if systematically answered, would draw attention to all the important problems which must be solved.

General Survey

At the stage when the chemical flowsheet and the answers to the questionnaire were available, the project should be reviewed by the engineering, medical, safety, operating and welfare officials or departments, said Mr. Braham. The resulting opinions and recommendations, which it was suggested should be recorded in writing, should then be investigated by the chemical research and development departments as well as by the engineering design department, in order that an agreed basis for the design of the plant should be determined. The engineering design department, then being in possession of approved technical flowsheets, should prepare engineering line diagrams for the plant, incorporating all information necessary for the preparation of design drawings of the various items of equipment, whether for direct fabrication or for the issue of inquiries to suppliers, and for the preparation of layout drawings.

Safety in engineering design, continued Mr. Braham, must be considered under the following heads:—(1) The preparation of engineering specifications for plant, buildings and equipment, whether they are to be designed by the company or the company's supplier. (2) The design of the individual items of plant and equipment. (3) The preparation of the layout drawings for the complete plant or factory.

Obviously, the ultimate responsibility for the safety aspects of the design of a chemical plant or factory rested with the management of the company, commented Mr. Braham, but managerial responsibility must, for obvious reasons, be confined to safety policy and to ensuring that adequate and competent staff were available, and that the company's organisation, both from a personnel and technical point of view, was a satisfactory one. It was most desirable that responsibility for carrying out the company's safety policy in the design stage of a particular project should be vested in one rather than a number of persons. It might naturally be felt that the responsibility should be given to the company's safety officer or corresponding official, but it was better that this official's functions should be purely advisory, and that the executive responsibility should be placed elsewhere.

Wide Experience Needed

It had been suggested that the responsibility for design work should be placed on a man of wide practical experience rather than on an expert technician, Mr. Braham said. That principle was strongly advocated also in regard to the safety aspects of design, and the best arrangement was with little doubt that the control of design, both technical and from the safety point of view, should be entrusted to one and the same person.

As was necessary with the technical aspects of chemical plant design, safety features must be based on sound principles if satisfactory results were to be realised. Definite legal requirements for ensuring safe conditions in plants and factories existed in the Factories Act (1937) and in various statutory rules and orders, or statutory instruments as they would in future be designated. These requirements, while being specific in a general sense, were not in themselves sufficiently detailed in all cases to define the precise principles to be followed in each of the many cases confronting the designer. A strong plea must be made that the chemical industry, with its many and varied and often difficult problems, should provide its designers with detailed safety codes and regulations.

Experience of the preparation of such cores and regulations had shown clearly the need for those documents. The existence of widely varying opinions and the paucity of information on many important points had emphasised this need. It was, of course, true that, in addition to those

already mentioned, there existed many publications dealing with safety: these provided much of the information which was required by the designer, but often unfortunately not in a wholly suitable form. What was wanted by the designer was a cyclopedia rather than a treatise, a cyclopedia fully indexed and also fully cross-referenced to legal requirements.

The provision of safety codes and regulations for chemical plant design, however comprehensive, would not, of course, of itself give rise to plants and factories which were satisfactory from the point of view of safety. Managerial interest at all levels was an essential requisite, and this interest must take a practical form involving the institution of effective methods of ensuring that the requirements of the codes and regulations were implemented. There must be nothing haphazard in the procedure adopted. The use of questionnaires and history sheets, which had already been mentioned, advocated as providing satisfactory means of checking that the required procedure was followed.

Codes and Regulations

Slavish and unimaginative following of requirements set out in codes must be avoided; codes should be guides to good practice, and regulations should be statements of statutory requirements and of the amplifications of these requirements necessary to meet special and local conditions, Mr. Braham continued. The purpose of a questionnaire was to ensure that all relevant matters shall be considered. In the preparation of one for the chemical research and development and the engineering specification stages of a plant or factory, it is suggested that it should be built up on the following framework. Starting with the substance involved in the chemical process, these fall into four main categories:—raw materials; intermediate products; by-products; final products. The substances in each of these could be further classified in three categories:—gases and vapours; liquids; solids. Finally, all the substances could then be classed under hazard categories such as combustion, explosion, corrosion, poisoning.

The meaning of each of the hazard categories must be clearly defined and understood, said Mr. Braham, so that, for example, substances producing dermatitis, silicosis, asphyxiation or paralysis shall be properly classified. To ensure correct classification and that no hazards were overlooked, the classification of the substance involved should be carried out by the medical departments.

In using a questionnaire of this form, all substances involved in the chemical process, whether they introduced a hazard or not, should be listed under the first two groups of categories; this practice would minimise the chance of any hazard being overlooked, continued the speaker. Each substance should then be considered and entered in the hazard classification group with full particulars relative to the hazard or hazards it introduced such as flash point, explosive limits to toxic concentration. Recommendations should also be recorded as to precautionary measures such as, to take an extreme case, that the plant or section of plant handling the substance should be housed in a cubicle and operated by remote or automatic control.

The suggested organisational procedure for using the questionnaire was that the research and development departments should first list all the substances involved in the process under the first two groups of categories, and should give under the third any new knowledge which had been gained from the research and development work which was relevant to safety considerations. The questionnaire should then be passed first to the medical and then to the safety and operating departments, which should each enter in the third group all information necessary adequately to acquaint the engineering department of the hazards arising from the substances involved in the chemical process which must be taken care of in the design and layout of the plant or factory. Finally, the questionnaire should be passed to the engineering department.

The questionnaire for the use of the engineering design department was really a complimentary document to that which had just been described, and should aim at ensuring that attention was given to such matters as safe positioning of discharge pipes from safety valves, guarding of machines, effective means of isolation of pressure vessels for maintenance purposes.

Chief Categories

Various forms for a questionnaire would suggest themselves, but whatever the form adopted, it must be fully comprehensive. It would usually be convenient for the main categories to be: Civil engineering items; mechanical engineering items; electrical engineering items; miscellaneous items. The civil engineering category could, for example, be divided under, to quote a few, the following sub-categories: railways, roads, footpaths, water supply, drainage, pipe bridge and culverts, wharves.

To ensure that the detail procedure adopted for guiding the design of chemical plant was followed, it had been recommended that all projects should be the subject of a history or progress record sheet. This document should cover all phases of

WIDE SCOPE FOR THE SILICONES

Some New Applications Impending

MR. W. K. GIVEN, of the chemical department of the (U.S.) General Electric Co., Pittsfield, Mass., in an address and demonstration of silicones to the American Society of Mechanical Engineers, recently, said he foresaw that many more products were due to be developed in what he described as this " new chemical family."

Because of the ability of the silicones to withstand extremes of heat and cold, to resist moisture, and to remain unaffected by most other chemicals, some of their uses would be revolutionary, he said.

Electrical equipment with a silicone insulating material " may bring about a change in our thinking. Instead of wondering how much heat the apparatus will withstand before the insulation breaks down, we may wonder how much heat it will stand before the copper begins to anneal."

A glass laminate produced from silicone resins was the basis of such insulation. A piece of this, placed for a week in an oven heated to 250°C. in the G.E.C.'s plastics laboratory showed improved mechanical and electrical properties at the end of the baking. Silicone resins, in addition to their recognised contributions to oils, greases and rubber, would also be used to make varnish, enamels and paints to finish refrigerators, stoves, laundry, dairy and hospital equipment. Such finishes resisted acids, alkalis, fresh or salt water, oils and climatic conditions, and because of the ability of the silicones to resist heat, white finishes, such as those on ovens, would not discolour even when subjected to temperatures of 485°F. for long periods.

One of the silicone products, polyorganohalogenopolysiloxane, was used to produce a water-repellant film employed, among other things, in the treatment of radio and radar insulators for aircraft, windscreens, camera lenses, textiles and paper. Porous porcelain filters so treated would permit the passage through them of compressed air, petroleum and solvents, but not water. A silicone water-repellant film, said Mr. Given, might some day be used to treat cloth for clothing.

In Aircraft and Industry

Silicone oil which did not thicken in low temperatures and become thin in high ones, was used for aircraft hydraulic systems for operating controls, permitting smaller piping, less liquid, and reducing the danger of fire from leakage because of its high flash point and low inflammability. One of the largest uses of silicone products at present was a mould release agent, which permitted rubber tyres, rubber soles and heels and other products to come out of the moulds more easily.

Many military and industrial uses of silicone rubber were outlined by Mr. Given. A sample which had been baked for 36 hours in an oven heated to 300°F. was shown to be still resilient. Used for military searchlight gaskets, it cushioned the glass lenses against shock and remained pliable over a very wide range of temperatures. It was used during the war on many 'planes for turbo-supercharger gaskets.

A freak product of silicone rubber research, the speaker recalled, was the " bouncing putty " currently being used to form the centres of golf balls, and a Detroit manufacturer was using it in a device to keep tables and chairs level.

THE INFLUENCE OF CHEMICAL PLANT DESIGN (*Continued from previous page*)

the work, from preparation of the chemical flowsheet by the research and development departments to the final design of the plant or factory by the engineering department or by the supplying firm. If this document was to be an effective instrument of control it was essential that there should be active managerial interest in it, and it was recommended that, as a matter of routine, it should be submitted at regular intervals to appropriate members of the management.

In conclusion, Mr. Braham said, two points must be stressed. The first was that the procedure advocated in his paper could never of itself ensure a chemical plant or factory which would be safe to operate and maintain. If freedom from accident was to be achieved, just as much attention must be devoted to operational and maintenance procedure as to design. As many accidents resulted from faulty maintenance or incorrect maintenance procedure as resulted from defects of design. The second point was that no system directed at the elimination of industrial accidents would be successful unless it had full management support and was given constant and active attention by the management.

[Summaries of the several other papers presented before the conference will be published next week]

Cement Plant in S. Australia.—It is hoped that the £A200,000 cement plant which is nearing completion at Birkenhead, S. Australia, will be in operation by the end of this year. Another cement company is planning to erect a plant at Angaston.

Polymeric Processes

U.S. Application for English Patent

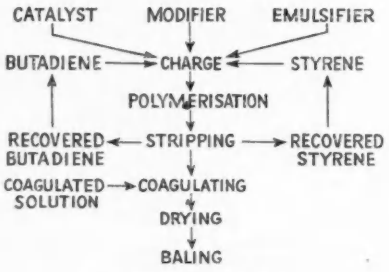
THE manufacture of polymeric material such as synthetic rubber is the subject of an English patent application—No. 2103/1948 (THE CHEMICAL AGE, October 2, 1948). The applicant is the Firestone Tyre & Rubber Co., Akron, Ohio, U.S.A. (Conv. date 12.3.47).

The present invention relates to the manufacture of polymeric materials from aqueous emulsions, and especially to separation of unreacted monomers from emulsions after polymerisation has been completed.

Usually an emulsifying agent, polymerisation catalyst, and generally a modifying agent are included to give good processing properties to the final polymer. The final emulsion containing dispersed polymeric material also contains unreacted monomers, and such dispersion is known as latex, the amount of which depends on the extent of polymerisation.

These monomers are generally highly volatile, also toxic, inflammable, and sometimes explosive. This inconvenience could be overcome by complete polymerisation, but this is nearly always difficult and undesirable.

In the present invention a process is claimed for recovering polymerisable material from emulsion or aqueous mixture by vaporisation and condensation, for which suitable apparatus is described in accordance with the following lay-out:—



"Depreciation and Maintenance"

Part III of Mr. S. Howard Withey's series of articles on depreciation and maintenance accounting for chemical plant is held out of the current issue owing to pressure of topical material. It will be published next week.

Oxygen Technology

Russian and German Processes

DETAILED information on the large-scale production of oxygen in Germany is included in a newly released report this week by the U.S. Office of Technical Services in which equipment used by the Messer Company, chief German manufacturer of large-scale air separation plants of other than Linde-Frankl design, is fully discussed. Other subjects in the report include the physical constants of gases; the acetylene hazard; operation at low pressure only; the Heylandt proces; and the Kapitza (Russian) process.

The description of the Kapitza process, of particular interest to technicians during the past two years, was obtained through an interview with Dr. Linde, German authority on oxygen production. Dr. Linde questioned the theoretical efficiency of the process, and said that little is known concerning the extent to which actual installations have been made.

In the discussion of the acetylene hazard in oxygen production, the report points out that acetylene is sometimes present at the air intake in concentrations sufficient to produce a definite explosion hazard during the oxygen production cycle. Information is given on methods for determining the presence of acetylene and other hydrocarbons in liquid oxygen; and the successful use of recent silica gel adsorbers in removing these impurities is discussed.

High Purity Preferable

Throughout the report references are made to the commercial use of oxygen in quantity. There is evidence that, while the production of oxygen in purities up to 99 per cent requires rapidly increasing amounts of energy, its manufacture in concentrations of less than 95 per cent is not economic. It is believed that a better method for obtaining low-concentration oxygen is to mix a high-purity sample with air before use.

The report, in addition to a special bibliography, and list of personnel and plants checked, contains 51 figures providing data relating to large-scale production.

No. PB-88840, "Large Scale Production of Oxygen," the U.S. Office of Technical Services, Department of Commerce, Washington 25, D.C

Soviet Zone Steel Targets.—The steel industry of the Soviet zone of Germany is stated to have been set a raw steel target of 148,000 tons for the second half of this year and of 30,000 tons of special and 110,000 tons of rolled steel.

Metallurgical Section

Published the first Saturday in the month

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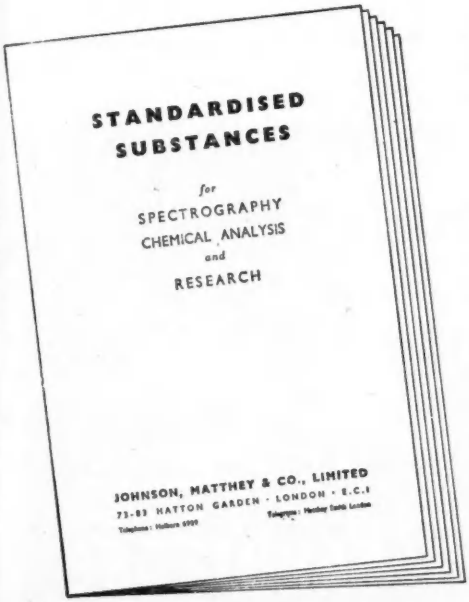

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Metallurgical Section

6 November 1948

IRON AND STEEL NATIONALISATION

Proposals to Acquire 95 per Cent of the Industry

HOW wide is the scope of the Government plans for control by the State of British iron and steel production was revealed by the publication on Friday last week of the Iron and Steel Bill and by information afforded in ample measure by the Ministry of Supply.

The Bill sets out in its 88 pages provisions for taking over, probably on May 1, 1950, by an Iron and Steel Corporation of Great Britain 107 of the principal undertakings in the industry and their numerous subsidiaries, many of which are solely concerned with the production of finished goods of widely differing kinds. Approximately 300,000 workers are affected and £300 million is likely to be required to compensate existing stockholders. The firms named in the third schedule of the Bill have total issued capital of £195 million.

The proportions of the total to be taken over in the eight chief sections of the industry represent in the aggregate a little more than 95 per cent of the whole.

Recent Production

The criterion applied in determining what firms are intended to come under control by the corporation is shown to have been the scale of recent production. Thus the major undertakings affected are those whose annual output exceeds 50,000 tons of iron ore, 20,000 tons of pig-iron, ingot steel or hot-rolled steel materials. Their subsidiaries will automatically be absorbed regardless of their output. Smaller undertakings will not be taken over but will be subject to a licensing scheme, which will prescribe prices and conditions for their continued operation. This provision refers to firms producing more than 5000 tons of ore or other products but less than the prescribed maxima; those producing less than 5000 tons will be enabled to operate independently, but will be dependent upon the corporation for their supplies.

Considerable emphasis appears to have been given to the principle, contrasting with previous Bills for State control of industries, that the companies are intended to maintain their identities and individual trading arrangements, subject to overriding control by the corporation, comprising a chairman and four to ten members, all appointed by the Minister of Supply. It is also proposed by the sponsors of the Bill that existing directorates will continue to function.

Among the many other provisions of particular significance are those which would permit the Minister to disclaim any agreements entered into without his sanction after October 28, 1948, and those under which compensation will be assessed. The latter afford stockholders the alternatives of compensation based on Stock Exchange quotations during October 1-25 this year or payment at the prices ruling immediately prior to the last election. No allowance is made for the fact that during both periods stock values were artificially low.

The companies named in the third schedule of the Bill as "fulfilling conditions for vesting of their securities" are as under:—

Arthur Lee & Sons, Ltd.; Bairds & Scottish Steel, Ltd.; Barrow Haematite Steel Co., Ltd.; Barrow Ironworks, Ltd.; Bayliss, Jones & Bayliss, Ltd.; The Beckermet Mining Co., Ltd.; Birchley Rolling Mills, Ltd.; The Briton Ferry Steel Co., Ltd.; Brown Bayley's Steel Works, Ltd.; Brymbo Steel Works, Ltd.; Burnell & Co., Ltd.; The Byfield Ironstone Co., Ltd.; The Bynea Steel Works, Ltd.; Cargo Fleet Iron Co., Ltd.; Carron Co.; The Clay Cross Co., Ltd.; Colvilles, Ltd.; Consett Iron Co., Ltd.; The Cranford Ironstone Co., Ltd.; The Crosby Ironstone Co., Ltd.; Darlington & Simpson Rolling Mills, Ltd.; The Darlington Forge, Ltd.; Darwen and Mostyn Iron Co., Ltd.; The District Iron and Steel Co., Ltd.; Dixon's Ironworks, Ltd.; Dorman, Long & Co., Ltd.; The Elba Tinplate Co., Ltd.; English Steel Corporation, Ltd.; The Etna Iron & Steel Co., Ltd.; Executors of James Mills, Ltd.; Firth Brown Steels, Ltd.; Gjers, Mills & Co., Ltd.; The Glamorgan Hematite Iron Ore Co., Ltd.; The Glynhir Tin Plate Co., Ltd.; Goldendale Iron Co., Ltd.; The Gorse Galvanizing Co., Ltd.; Guest, Keen and Nettlefolds, Ltd.; Guest, Keen & Nettlefolds (South Wales), Ltd.; Guest Keen Baldwins Iron & Steel Co., Ltd.; Hadfields, Ltd.; Hadfields Steels, Ltd.; The Hallamshire Steel and File Co., Ltd.; The Hodbarrow Mining Co., Ltd.; Irchester Ironstone Co., Ltd.; James Pain, Ltd.; J. J. Habershon & Sons, Ltd.; John Bagnall and Sons, Ltd.; John Baker & Bessemer, Ltd.; John Lysaght, Ltd.; John Lysaght's Scunthorpe Works, Ltd.; Johnson's Iron and Steel Co., Ltd.; John Summers & Sons, Ltd.; The Kettering Iron and Coal Co., Ltd.; The Lanarkshire Steel Co., Ltd.; The Lancashire Steel Corporation, Ltd.; The Lilleshall Co., Ltd.; The Lilleshall Iron & Steel Co., Ltd.; The Llanelly Steel Co. (1907), Ltd.; The Loddington Ironstone Co., Ltd.; London Works (Barlows), Ltd.; The Millom & Askam Hematite Iron Co., Ltd.; Monks, Hall & Co., Ltd.; Naylor Benzon Mining Co., Ltd.; The Neath Steel Sheet and Galvanizing Co., Ltd.; The New Cransley Iron & Steel Co., Ltd.; The New Jarrow Steel Co., Ltd.;

The Oxfordshire Ironstone Co., Ltd.; The Park Gate Iron and Steel Co., Ltd.; Partridge Jones & John Paton, Ltd.; The Patent Shaft and Axletree Co., Ltd.; Pease & Partners Lingdale Ironstone Mines, Ltd.; Pease & Partners Normanby Iron Works, Ltd.; Raine & Co., Ltd.; The Renishaw Iron Co., Ltd.; Richard Hill, Ltd.; Richard Johnson & Nephew, Ltd.; Richard Thomas & Baldwins, Ltd.; Round Oak Steel Works, Ltd.; Samuel Fox and Co., Ltd.; The Santon Mining Co., Ltd.; The Sheepbridge Co., Ltd.; The Sheffield Forge and Rolling Mills Co., Ltd.; Shelton Iron, Steel & Coal Co., Ltd.; The Skinningrove Iron Co., Ltd.; Smith & McLean, Ltd.; South Durham Steel and Iron Co., Ltd.; The Stanton Ironworks Co., Ltd.; The Staveley Coal and Iron Co., Ltd.; The Staveley Iron and Chemical Co., Ltd.; The Steel Company of Scotland, Ltd.; The Steel Company of Wales, Ltd.; The Steel Company of Wales (Lysaght Works), Ltd.; Stewarts & Lloyds, Ltd.; Taylor Bros. and Co., Ltd.; The Templeborough Rolling Mills, Ltd.; Thos. Firth & John Brown, Ltd.; The Ullcoats Mining Co., Ltd.; The United Steel Companies, Ltd.; The Upper Forest and Worcester Steel and Tin Plate Works, Ltd.; The Wellingboro' Iron Co., Ltd.; The Whitehead Iron and Steel Co., Ltd.; The Whitehead Thomas Bar and Strip Co., Ltd.; William Beardmore & Co., Ltd.; William Jessop & Sons, Ltd.; Wolverhampton Corrugated Iron Co. Ltd.; The Wolverhampton Steel and Iron Company (1946), Ltd.; W. Wesson & Co., Ltd.

WORKERS' BALLOT PROPOSED

A CHALLENGE by Mr. Geoffrey Summers, director of Shotton Steel Works, to the North Wales Area of the Transport and General Workers' Union, to conduct a ballot among the workers on the nationalisation issue, has been answered by the area secretary of the union, Mr. H. T. Edwards. In issuing the challenge, Mr. Summers had referred to a resolution of the area committee welcoming the Government decision to nationalise steel. He maintained that if a secret ballot was taken of steel workers at Shotton the result would be a majority against nationalisation. Mr. Edwards said he would gladly accept Mr. Summers' challenge to ballot his own union members at the steel works, but on certain conditions. One was that Mr. Summers agreed to debate the issue in public with him and to ensure that every worker was given an opportunity of listening to the debate. This would mean debating the issue three times to meet the requirements of each shift. Another condition was that the ballot should be taken outside the works, so that the public could feel assured it was conducted free from influence of trade unions and the firm.

Lethal "Smog"

Reports reflecting an extreme degree of atmospheric pollution come from the U.S.A. concerning the effects of "smog"—acid fumes combined with smoke and fog—in the steel-making town of Donora, Pennsylvania. A high concentration is thought to have caused the death of about 18 people in a single day, and to have affected about two hundred others, who are receiving treatment.

Growing Opposition

Scottish Steel Chiefs' Views

CRITICISING the Government's plans to nationalise the iron and steel industry, Lord Clydesmuir, a member of the board of directors of Colvilles, Ltd., said that he could not see the advantage of changing ownership from a wide section of the population to a bureaucracy at Whitehall. Lord Clydesmuir, who was addressing business men at a lunch given by the Glasgow Central Division of the Unionist Association, said that the Labour Party had made much of "private monopolies," but in Colvilles there were 14,000 shareholders and about the same number of employees.

Only a small percentage of the shareholders held more than 1000 shares. For every £1 of sales last year's dividends represented 2d., whereas wages, salaries, and superannuation represented 5s.

The case for the nationalisation of the industry was based almost entirely on old history, and it left out of account the magnificent record of the industry at the present time. Production was 10 per cent greater than in the peak year before the war, and prices were lower than in any other steel-making country except Australia.

It was argued that the men were working well only because of the promised nationalisation, but exactly the opposite argument had been used when nationalising the mines. Wages in the steel industry averaged over £7 compared with less than £4 in 1938. Good industrial relationship machinery existed for settling wages disputes, and there had been no major strikes for many years.

Many Anomalies

Scottish steel chiefs, opposing the Government's plans for State control of the iron and steel industry, are expected to provide greater resistance than has been brought against any previous measure of nationalisation.

Already, it is clear that they have strong grounds for complaint against the Government's plans, apart from the general principle of nationalisation. Many of the subsidiaries of the "Big Ten" to be nationalised in Scotland which are to be incorporated are engaged in the same kind of work as firms which are to escape State control. Accordingly, in certain fields of production the State will be competing with private undertakings. Nearly 30,000 employees in Scotland are affected by the Bill.

ELECTRIC FURNACE BRAZING

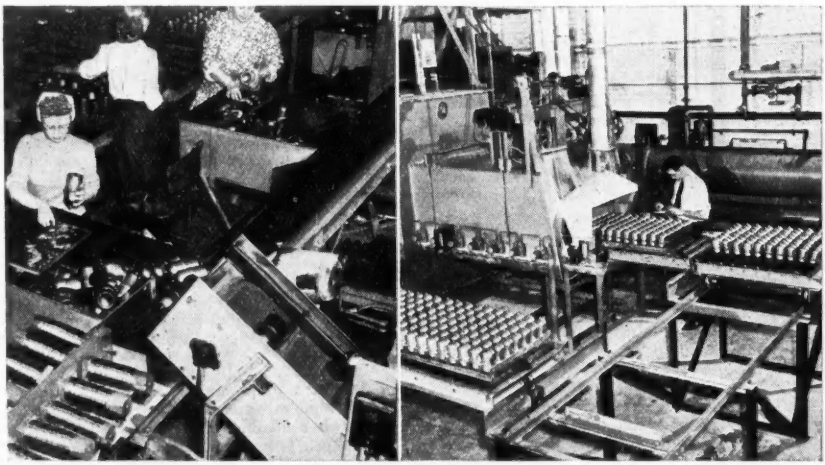
Economical Use of Low-Grade Copper

ELECTRIC furnace brazing has been found greatly to facilitate the fabrication of insecticide bombs at the Aer-A-Sol Division of the Bidgeport Brass Company, Bridgeport, Connecticut, where this method is reported to have improved the quality of the bombs, simplified their construction, and lowered manufacturing costs. The containers, which are made of U.S. SAE-1010 steel .043-.049 in. thick and contain a liquid insecticide under about 90 p.s.i. are manufactured at an average of approximately 10,000 per eight-hour shift.

Originally, these containers were made by a bonding method which involved locally heating each joint and using brazing metal and flux. With this method, considerable difficulty was encountered after brazing in removing deposits of charred flux from the interior of the bombs. This was necessary since loose particles tended to clog the .008-in. diameter opening of the specially designed dispensing valve of the bombs. In addition, there was the ever-present danger of corrosion from moisture trapped in the bomb.

With electric furnace brazing, inexpensive copper is employed as the brazing metal, and no flux is required. Consequently, the bomb assemblies come from the furnaces clean and bright, no oxides or foreign matter are present, corrosion and moisture hazard are eliminated, and the bonds are uniformly tight and strong, testing almost 100 per cent free from leaks. In addition, all four of the assembly joints are bonded simultaneously in a single trip through either of the two General Electric Company's continuous furnaces. With this brazing process, the assemblies are put together with the brazing metal pre-placed near the joints to be brazed.

As the containers pass through the heating chamber of the furnace, a reducing atmosphere frees the metal from any oxides present, prevents the steel from oxidising, and thus prepares the parts to be wetted by the molten copper. When the brazing metal melts, it is drawn into the joints of the assemblies by capillary attraction and forms alloys with the steel. Transferred to the adjoining controlled atmosphere cooling chamber, the solidifying alloys develop great strength, and the bombs gradually cool to a temperature at which it is safe for them to come in contact with the outside air without danger of discoloration caused by oxidation. (*Continued overleaf*)



Placing in position the copper wire rings preparatory to brazing; (right) charging the containers into the electric furnace, to which the converter, seen in the background, supplies a reducing atmosphere to prevent oxidation and facilitate the metallic union

Each of the roller hearth copper brazing furnaces used in this application consists essentially of a heating chamber 9 ft in length and an adjoining water-jacketed cooling chamber 30 ft. long. The heating chamber is equipped with electric heating units rated 180 Kw, divided into two 90 Kw

The completed "bomb", a safe high-pressure container of spray liquids

zones, each with separate power and temperature control.

The heating units are made of heavy rolled ribbon, formed in sinuous loops, mounted in the roof of the chamber and on the side walls above and below the roller conveyor running through the chamber. The cooling chamber is made of two concentric rectangular steel shells to provide a water jacket, and is divided lengthwise into three sections, each with a separate water circuit. The first section of the cooling chamber has automatic cooling water temperature control, to prevent condensation during idling periods.

Hollow cast alloy rolls are used throughout the charging vestibule, heating chamber, and the first section of the cooling chamber. Solid steel rolls are employed in the remaining sections. Water-jacketed, self-aligning roller bearings are mounted on the sides of the casing except in the last two cooling chamber sections, which do not require cooling. The rolls are motor-driven through a chain and sprocket mechanism.

Consumption and Output

Each furnace is capable of brazing 700 containers per hour, which is a production of 700 lb. net, or 1352 lb. gross per hour. For this rate of production, the power consumption is about 157 kWh. Consumption of combusted gas for the furnace atmosphere is about 1500 cu. ft. per hour, which is made by burning about 675 cu. ft. per hour of coke-oven gas.

Throughout, the bombs are fabricated almost entirely on an assembly line basis. Belts or roller conveyors carry them from one operation to another until they arrive at the furnaces, where they are manually placed in the brazing trays. The trays are then automatically charged into the furnaces and travel slowly through them on motorised conveyors. After being discharged from the furnaces and inspected, the dispensing valves are added and the bombs are air-tested, marked and charged with liquid insecticide and then with Freon under pressure. Attached to an overhead chain conveyor, they are cleaned, lacquered, and again inspected.

Solder is Still Indispensable

"NOTES on Soldering," by W. R. Lewis, the latest publication of the Tin Research Institute, Greenford, Middlesex, emphasises that more soldering has been done in the last few years than ever before. This is due to successful development from the copper-bit soldering process to fully mechanised methods for mass production of telephones, radios, radiators for motor cars, cans for foodstuffs and every kind of hollow-ware made from tinplate, sheet steel, copper and brass. In these modern industries, the soldering process has undergone obvious modifications, but it remains unchanged in its dependence upon tin as the medium of the actual joining. As a means of economising in tin the low-tin solders were disappointing because, in general, the frequency of defective joints was so high as to constitute a serious waste of labour and materials and each used more solder and took longer to make. The chapters of the book deal with basic steps in soldering; mechanism and practical methods of soldering; joints in lead pipes; soldering of special metals and properties of solders and soldered joints. Included are 47 figures and many tables and bibliographical notes.

BRITISH WELDING PROSPECTS

Effect of New Technology and Cost Factors

By Dr. J. H. PATERSON, D.Sc., F.R.I.C.*

NO ferrous metal or alloy, and very few non-ferrous ones, has any worthwhile future unless it can be welded, either by one of the processes using electricity as a source of heat or by the oxyacetylene process. This means that the metal concerned must have such properties that its structure would not be unduly disturbed, and its mechanical properties adversely affected, by the welding process.

As metal manufacturers become more keenly aware of this requirement and metals generally come to have weldability as one of their basic properties, so the growth of the welding industry will be assured on an ever increasing scale. At the same time there must be an increase in the number and complexity of the welding processes and the young welding engineer of to-day is assured of a busy and exciting future in bringing this industry to perfection.

It is frequently said that common sense and enthusiasm are the main qualifications for a welding engineer, and this is true, provided that it is realised that no one can talk common sense about a subject with so many sciences forming its background unless he has a fundamental knowledge of these sciences.

It is right, therefore, that the Institute of Welding should set a high educational standard for the leaders of the welding industry and that this standard should be high enough to ensure that the senior members of the Institute can be regarded as masters of their subject.

Considering that the metallic arc welding process is only 56 years old, the amount of progress which has been made is extraordinary and this is equally true of the resistance welding processes. It is also obvious that developments in methods and application will have to be very wide indeed if they are to keep pace with the spate of new alloys which are finding their place in the engineering industry.

Greatest Expansion

The greatest expansion in recent years has probably been in the various arc processes, *i.e.*, the metallic arc, the helium or argon arc, the carbon arc, and the atomic hydrogen process, and this expansion is by no means at an end.

All these processes have one common factor, namely, that they employ electrical energy as a source of heat and it is remarkable that up to the present very little attention has been paid to the economic use of this energy. This is surely a matter which will require attention and might result in improved methods of welding coming to the fore.

It is not generally realised that, assuming the thermal efficiency of a power station generating electricity from coal is 20 per cent and that the thermal efficiency of the arc is 25 per cent of the power used, only 5 per cent of the energy originally contained in the coal is effectively set free in the arc, and that even then a high proportion of the energy is unwanted and even dangerous when the heat generated results in the serious disturbance of the structure of the metal being welded, or causes distortion of the work piece.

In addition to this, the ever growing size of the single phase load required for both metallic and resistance welding, accompanied as it frequently is by a bad power factor, is causing some power station engineers to look askance at the welding industry and even in some cases to take measures to safeguard their position, which may greatly handicap the future applications of the process.

Cost of Welding

Very large potential users of welding, such as the shipbuilding industry, are apt to criticise the cost of welding, claiming that it is too high to be universally used as in an all-welded ship, and users of steel castings are relying on a much dearer fabricated job mainly because of the shortage of labour in the foundries, although they would probably prefer the fabricated article if a welded one compared reasonably in price.

Thus it is clear that as a contribution towards reduction in cost the more economic use of energy becomes a matter of importance, not only from the cost point of view, but because of the better processes which would undoubtely result.

There is already looming on the horizon in the shape of the inert gas shielded arc process, *i.e.*, a process using a gas shield of argon or helium, one method of welding which may show the way to a better thermal

*Summary of Dr. Paterson's presidential address to the Institute of Welding, at the Institution of Civil Engineers, London, S.W.1, on October 27.

balance sheet and hence to a more satisfactory welding process.

The use of one of these gases for shielding the arc appears to enable molten metal to wet the surface of the parent metal at comparatively low temperatures and there is no doubt that these processes are on the eve of considerable development.

They are, in this country at least, handicapped by the high cost of the inert gas but it is quite certain that with the extended use of argon the price will come down considerably, and even if there is no helium, it is not improbable that one of the nuclear fission processes will give us all the helium we want as a by-product.

Welding Research

We may, indeed, find the welder of the future pouring superheated liquid weld metal from an induction heated syphon under an atmosphere of argon or helium into the prepared groove in his welded joint, and this providing a weld of the exact composition and cleanliness desired, and at the right temperature to ensure the most satisfactory join without overheating the parent metal.

The impact of our sister organisation, the British Welding Research Association, on the future of the industry must not be forgotten. While this association may not be directly responsible for the production of new welding methods or processes, its investigations into the scientific foundations of the industry have already had a noticeable effect on the trend of method and application, which will undoubtedly grow with the passing years. Their investigations into the properties of rigid structures are only the opening chapters of a new theory and practice in structural design.

The work of the Electrical Research Association on the physics of the welding arc has only just commenced but will in the future add to our store of knowledge on a vital subject and the British Non-Ferrous Research Association places the problem of weldability in non-ferrous metals among its more important investigations, thus helping towards that desirable era when weldability will be taken for granted as an inherent property in our main structural metals.

All this wealth of investigation and research soon finds its way into industry and slowly but surely enlarges and improves the possibilities of the whole of engineering science. Giant welded fabrications, impossible of achievement by any casting or forging process, produce new engineering methods and welding makes possible the construction of high temperature resisting movements which go to the construction of the internal combustion turbine of the future. It is here that the Institute of Welding in the future will find its most important work.

Saving in Steel

Towards the end of last year the president of the institute (Mr. J. L. Adam) asked for a special report on the savings in steel made possible by welding, and specialists in a variety of industries, who could make accurate comparisons between similar welded and riveted structures which they had actually undertaken, were invited to do so. This report, not yet published, has already been of great value to one Cabinet committee dealing with economy in steel and will be of greater value when completed and published.

Standardised Threads : Anglo-American Agreement Sought

THE culmination of 30 years of study of screw threads, a joint conference of representatives of Government committees and industrial standardisation groups from Great Britain, Canada, and the U.S.A. is scheduled to meet within the next three months to conclude agreements on common standards for screw threads used on most types of threaded fasteners, including bolts and nuts. The attainment of such standards is of paramount importance to commerce and industry and could greatly increase the international exchange of engineering equipment.

It is planned to hold the forthcoming conference at the U.S. National Bureau of Standards, which has actively co-operated in the attainment of this objective over a period of years. These agreements will not be in the form of a treaty, but will be based upon separate documents, each of which is sponsored by the standardisation group or groups of each of the countries concerned. These documents, setting forth the Unified Screw Thread Standard, will be in agreement on all fundamental points relating to the standard, but may differ in minor details. The purposes of the joint conference are to assure that there is complete agreement on all fundamentals and to celebrate the attainment of such agreement after many years of negotiations.

In September-October 1945, a conference on Unification of Engineering Standards was held in Ottawa, Canada. At this conference a unified form of thread having a 60° angle, together with standard sizes and pitches, was agreed upon. Thus the foundation was laid for the standards now being presented.

ELECTROLYTIC METAL POLISHING—III

Uses in Surface Study and Related Fields

MORE important even than its technical use in giving a fine finish to metallic articles is the very marked superiority of electrolytic over mechanical polishing as an effective means of studying surface phenomena and for metallurgical testing generally. This indeed was the basis of much of Dr. P. A. Jacquet's earlier work, and in his new book he devotes the whole of Parts 2 and 3[1], to these aspects: part 2 dealing with physico-chemical work and part 3 with micrographical studies.

Even this extensive survey relates only to magnesium, aluminium, and their alloys. Already this year new material has accumulated. For example, in *Comptes Rendus*, 1948, *227*, 556-8 (September 13) he describes an improved method for anodic polishing of iron and steel, and chromium, for micrographic examination.

The electrolyte contains some perchloric acid, on the alleged dangers of which there has been much discussion, though it is held that these can be reduced to a minimum by careful working. However, one of the principal features in what is claimed to be an improved method over that of P. Rocquet of 1939 is the use of much less perchloric acid, whereby the risk is reduced and the process accelerated. The electroiyte may consist, for example, of 1000 c.c. acetic acid (pure crystalline), and 50 c.c. perchloric acid of 60-65 per cent strength and density 1.59-1.61. The two acids in these proportions mix readily without heat, and may in fact be used at fairly high temperatures without danger.

Best Electrical Values

The best polishing effects were obtained with an anodic c.d. of 11 amp./dm², although an amperage up to 30 may be used, the terminal voltage being 30-50 v. Polishing is controlled by simple regulation of cell voltage. The relatively high voltage mentioned may be reduced by adding a little distilled water; or by using a circular cathode—completely surrounding the anode—in place of a flat one. The time required is 2-3 minutes.

The main lines of the physico-chemical studies referred to consist in: (a) *aluminium and light alloys*—measure of reflecting power, X-ray diffusion and diffraction, X-ray micrography, electron diffraction, microgeometry, use of electron microscope; (b) *anodic oxidation of Al*—alumina film defects, mew method for separating (isolating) alumina films[2], measurement of thickness, and growth and structure; (c) *measurement of solution potential* and application; (d) *study of surface corrosion*—attack on Al in liquid medium, corrosion of Al generally, corrosion of pure Mg in damp air, high temperature oxidation of Al; (e) *measurement of micro-hardness* and uses thereof—effect of electrolytic polishing on hardness values of Al, metal diffusion in Al, determining solubility curves; (f) *study of lines of slip*—lines of slip and corrosion patterns, plastic slip in Al crystals.

Aid to Micrography

The advantages, technical and economic, of electrolytic polishing for purposes of micrographic examination of metals have been studied by Jacquet in some detail. Additionally, a useful summary of this and related matters and an extensive bibliography was presented by him in his paper read at the third International Electrodeposition Conference last year, the proceedings of which have just been published by the Electrodepositors' Technical Society.

There are undoubtedly many technical advantages in the new method, among which may be cited, in the first place, the complete elimination of streaks or scratches on the surface which are practically unavoidable with mechanical methods. This must necessarily be of great importance in micrographic or similar studies.

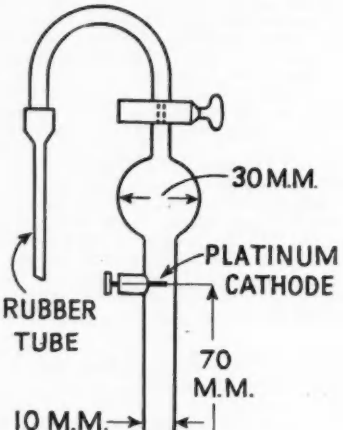
There is complete absence of oxide films or films due to cold working, rolling, etc., of which the former must be the more important; the latter may to a large extent at least be removed also by mechanical methods. The possibility of more complete or more reliable study of surface structure is another important recommendation. This is connected with the uniform solution of metal during electrolysis, *e.g.*, structural changes due to mechanical treatments such as milling or abrasion.

A very high reflective power is attained. An aluminium surface mechanically polished usually has a thin milky opalescent film with reduced reflectivity. This, too, disappears with electrolytic polishing, and reflective power increases up to 90 per cent. The fifth consideration is the great value of preserving intact the actual heterogeneous structure of the surface and nearby layers, namely, original cracks or blow-holes, inclusions and general impurities, and so on.

There is the further advantage of clearly showing up intercrystalline boundaries, a matter of special difficulty in the study of some alloys, but of considerable importance.

Part I and II were published on September 2 and October 9.

Lastly, electrolytic polishing enables one to deal with specimens of fairly considerable size, and of varying shape and thickness—down to fractional mm. For examination of exceptionally large specimens, various techniques have been evolved. One of these is shown in the accompanying figure. This is an electrolytic micro-cell



for polishing very small areas of a relatively large specimen. It has been described by Knuth-Winterfeldt in *Jerkontorets Annaler*, 1944, *128*, 77, and consists mainly of a pipette provided with a platinum cathode and an extremity of 1 mm. diam. which is applied to the part desired to polish.

The electrolyte is similar to that of De Sy and Haemers: 1 vol. perchloric acid with 4 vols. denatured ethyl alcohol (of which there are various modifications: Jacquet, *loc. cit.* pp. 47-55). A high c.d. is used (25-70 mA) and the time required is 10-15 sec.

A somewhat similar method has been described by Parcel (*Met. Prog.*, 1942, *42*, 209; *Met. Ind.*, 1943, *62*, 60). The device used by Russell of the Batelle Mem. Inst. (*Met. Technology*, 1941, September) is based on the same principle; but the cell is somewhat larger and a rubber joint between it and surface is used. Reference may also be made to J. Mazia's ingenious apparatus (*Monthly Rev. Am. Electroplaters Soc.*, 1947, *34*, 937) for brush electrolytic polishing.

Owing to certain peculiarities in structure, notably of aluminium, due to inclusions or impurities, Jacquet observes that some metallographers have denied that the electrolytic method is more reliable than mechanical polishing supplemented by chemical action. He therefore adduces experimental evidence to prove the contrary, with special reference to copper and alloys, steels, etc.

Starting with his own work with copper of 99.98 per cent purity, this, whatever mechanical and thermal treatment may have been given by the usual methods did not reveal any trace of foreign elements; whereas electrolytic polishing showed clearly and definitely numerous inclusions, extremely fine, but unmistakable. They were almost entirely sulphurous, *i.e.*, sulphur combined with copper and possibly also selenium and tellurium.

It is also shown on the evidence of F. H. Clark *et al.* that this method alone shows also the presence of cuprous oxides or pits and blowholes in the cast metal. With copper-glucinium (beryllium) solid solutions there is in each crystal a precipitation of CuGl definitely orientated.

Electrolytic polishing has shown, and X ray and electron microscope examination have confirmed it, that this constituent does not form at the stage of maximum hardening in grains of the solid solution. The streaks or scratches (stries) in fact, indicate loosenings or detachments (décrochages) along certain crystallographic planes. These are probably effects of corrosion at these points, caused by the reagents used. (*Comptes Rendus*, 1943, *217*, 22; *Rev. Metallurg.*, 1944, *41*, 1).

The dendritic structure of copper in lead bronzes is very indifferently observed in mechanically polished samples owing to wide differences in hardness of the constituents and to surface spread of the lead in the finishing operations.

Conflicting Views

In notes briefly comparing the various methods, from the point of view of micrographical and other studies, Jacquet considered that of De Sy-Haemers, either in its original or in its modified form, of special interest. With pure aluminium and homogeneous solid solutions, polishing with a very high c.d. gives satisfactory results, and fairly satisfactory, even when there are some impurities insoluble in the metal.

(To be continued)

REFERENCES

[1] P. A. Jacquet: "Le Polissage Electrolytique des Surfaces Metallurgiques," Vol I, 1948.
[2] This new method described on pp. 104–5 of Jacquet's work, Vol. I, is that of Lacombe & Beaujard (*Ed. Comm. Tech. des Etats etc.*, 1944, Cf. also *Metaux-Corrosion-Usure*, 1945, *20*, 43.

U.S. Metal Resources

Experts Review Some Scarcities

REVIEWING America's mineral resources position, with reference to stocks and reserves of aluminium, magnesium, copper, lead, zinc and lesser known metals and minerals, the views of a number of experts have now been presented by the National Industrial Conference Board, New York.

Dealing with the light metal industry, Mr. Irving W. Wilson, vice president of the Aluminum Company of America, stated that the annual capacity for the production of primary aluminium was increased from about 350 million lb. in 1939 to about 2300 million lb. in 1943; and the annual capacity for primary magnesium from about 7 million lb. to nearly 600 million lb.

Mr. Simon D. Strauss, sales manager of the American Smelting and Refining Co., said the copper industry to-day had actual copper reserves as large as it ever had.

"In the lead and zinc industries," stated Mr. Straus, "occurrences are not so easily measured as with copper. There are very few lead and zinc mines which at any time have known reserves of more than five to ten years of life ahead of them, based on their then current rate of production. The production of lead in the U.S.A. to-day, with the highest prices on record, is little more than 60 per cent of the maximum production which was attained during the late 'twenties."

Of zinc, Mr. Strauss said that production to-day was somewhere between 75 and 80 per cent of what it was in the 'twenties Based on the present peace-time use of copper, lead and zinc, the U.S.A. was not to day self-sufficient.

Dr. Richard J. Lund, supervisor of Engineering economics for the Batelle Memorial Institute, Columbus, Ohio, said that among the other non-ferrous metals, antimony and tin were still so scarce that limited government control had been extended and re extended over their distribution and use.

Canada's Growing Steel Industry

The building of a new blast furnace with a capacity of 1000 tons daily and the installation of a new plate mill form part of the scheme to expand Canada's steel industry. Construction is expected to take about two years.

This is reported to be the "minimum" programme, and it is likely that two blast furnaces may be built.

Iron Ore Discovery

150 M. Tons Reported in Labrador

THE discovery in Labrador of high-grade iron ore deposits, which may rival the Mesabi range in extent and quality of ore, has been described by Gilbert C. Monture, chief of the Mineral Resources Division of the Canadian Department of Mines and Resources, in a study prepared by the National Industrial Conference Board, New York.

"The new iron ore discoveries lie astride the Quebec-Labrador boundary," says this report. "Intensive drilling and exploration up to date have been confined to some 50 miles along the main ore zone. To the north-east and about 12 miles from the main ore zone there is a parallel group of deposits, but no work has been done on these."

Possible 300 M. Tons

The discovery has been compared with the great Mesabi Range in the United States. Relatively small-scale drilling has now proved approximately 150 million tons of ore. The objective is 300 million tons and it is hoped that this objective will be obtained this season.

A typical analysis of the ore is approximately as follows iron plus managanese 62.7 per cent; phosphorus .101 per cent; sulphur .008 per cent; silica 4 to 6 per cent. An interesting discovery made at the close of the field season was that some of the ore was very high in manganese, running 6 per cent or better. There is a fairly considerable size body of this ore.

The objective of proving 300 million tons is necessary to warrant the building of a railroad—350 miles long—to the deposits.

There is the prospect of developing ample hydro-electric power from local rivers or the more distant Hamilton Falls and it is likely that the ore could be delivered at the nearest deep-water point at a freight charge of $1.75 or $1.80 per ton.

Other Canadian Resources

Canada is, Mr. Monture explained, deficient in antimony, chromite of metallurgical, chemical and refractory grades, manganese, and vanadium. "Almost our entire requirements of all these metals must be imported," he states.

As to other metals and minerals, Mr Monture stated that Canadian refined copper production is now in the neighbourhood of 200,000 tons, while nickel is being produced at the rate of 120,000 tons a year. Metals in the platinum group total 230,000 oz per year. In addition, Mr. Monture said that Canada is able to export "well over" 125,000 tons of lead and 140,000 tons of zinc annually.

Production and Stocks of N-F Metals

THE following particulars of production, stocks, consumption, imports and exports of non-ferrous metals in the United Kingdom in September are extracted from the monthly figures supplied by the British Bureau of Non-Ferrous Metal Statistics.

UNWROUGHT COPPER

Long Tons

	Blister Copper	Refined Copper
OPENING STOCKS:		
Govt. and consumers' stocks	35,139	79,982
Imports into U.K. ...	15,973	21,648
PRODUCTION:		
Primary	—	12,537
Secondary	1,793	6,667
CONSUMPTION:		
Primary	12,621	29,836
Secondary	—	16,872
EXPORTS FROM U.K. ...	3,103	23
CLOSING STOCKS:		
Govt. and consumers' stocks	37,796	85,442

GROSS OUTPUT OF MAIN COPPER, ALLOY AND PRODUCTS

Unalloyed copper products	28,915 long tons
Alloyed copper products	25,204 „ „
Copper sulphate	1,260 „ „

UNWROUGHT ZINC

Long Tons

	Zinc in Concentrates (estimated gross zinc content)	Slab Zinc (all grades)
OPENING STOCKS:		
Govt. and consumers' stocks	21,617	61,341
Imports	2,072	9,877
PRODUCTION:		
Virgin and remelted	—	6,746
CONSUMPTION:		
Virgin (incl. debased)	7,408	20,006
Remelted and scrap	—	6,199
EXPORTS...	—	19
CLOSING STOCKS:		
Govt. and consumers' stocks	16,012	55,706

LEAD

Long Tons

	Lead in Concentrates	Imported Virgin Lead	English Refined	Lead Content of secondary scrap and Residues
OPENING STOCKS: Govt. and consumers' stocks	—	23,701	2,325	—
IMPORTS	12	10,103	—	—
PRODUCTION ...	164	—	3,612	—
CONSUMPTION ...	175	18,338	3,684	8,943
EXPORTS	1	57	—	—
CLOSING STOCKS: Govt. and consumers' stocks	—	16,324	2,253	—

TIN METAL

Long Tons

GOVT. AND CONSUMERS' STOCKS AT END OF PERIOD	11,506
IMPORTS	155
PRODUCTION	3,287
CONSUMPTION	2,122
EXPORTS AND RE-EXPORTS	93

ANTIMONY

Long Tons

TOTAL CONSUMPTION OF ANTIMONY METAL AND COMPOUNDS	454
TOTAL CONSUMPTION OF ANTIMONY IN SCRAP	310

CADMIUM

Long Tons

TOTAL CONSUMPTION OF CADMIUM	63.05

Castor Oil as a Substitute in Steel Casting

CONSIDERABLE success is foreseen for the recent efforts sponsored by steel founders to find a substitute for linseed oil, which is still allocated by a Cabinet Committee dealing with scarce commodities. Used in steel casting as a binding material for sand cores, only about 2 per cent of the weight of sand is required, but 5000 tons of the oil are used in the process every year.

At a conference called at Leamington Spa by the steel castings division of the Iron and Steel Research Association, specialists from the Ministry of Food oils and fats division, steel and plastics concerns and the universities, explored the prospects of finding substitutes. It was considered that castor oil might be used, especially as it is likely to be in fairly free supply for the next two years.

Prof. T. F. Hilditch, Professor of Industrial Chemistry at Liverpool University, said on October 25 that it was remarkable how many diverse interests were concerned in this particular problem, none of them being directly engaged in either smelting ore, casting steel or growing vegetable oils.

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American Chemical Notebook

From Our New York Correspondent

THE first plant designed and constructed in the U.S.A. for the production of low-purity oxygen for use in blast furnaces has begun operations at the Johnstown works of the Bethlehem Steel Company, which is associated with the Air Reduction Co., Inc., and the Koppers Company in the undertaking. Output of the plant will be taken by the Bethlehem Steel Company for experimentation in the use of oxygen for the enrichment of the air blast in furnaces. Spokesmen for the three companies said that when significant data had been accumulated as a result of this research work, it would be made available to the steel industry.

* * *

Adding to its growing list of protective literature, the Manufacturing Chemists' Association, Inc., this week issued Chemical Safety Data Sheet SD126 on phosphorus oxychloride, the 26th in its series of chemical product safety manuals, and Manual Sheet H-10 covering the handling and discharge of containers for hydrofluoric acid, both aqueous and anhydrous. Designed for supervisory staffs and management, the manual on phosphorus oxychloride presents essential information for the safe handling, storage and use of the chemical and names its physical and chemical properties. A comprehensive 22-page booklet containing eight illustrations, the manual on hydrofluoric acid supplements the Chemical Safety Data Sheet SD-25, previously issued.

* * *

Subject matter includes description of the product; general precautions, including complete data on hazards, first-aid and medical treatment; materials of construction, including piping, valves and fittings; detailed container practice for aqueous acid, including rubber drums, steel drums (lined and unlined), lead carboys, tank cars and tank trucks; instructions for handling and unloading cylinders of anhydrous acid, including detailed information on emptying the cylinder and introduction of the acid into process, both as a liquid and a gas. Copies of these booklets may be obtained from the Manufacturing Chemists' Association, Inc., 246 Woodward Building, Washington 5, D.C., U.S.A.

* * *

The United States Atomic Energy Commission announced this week that negotiations are being conducted with the Vanadium Corporation of America for the purchase of uranium from two treatment plants scheduled to be brought into operation in 1949. One of these plants is the Commission-owned vanadium-uranium mill at Durango, Colorado, for which a lease is being arranged, while the other is a new plant to be erected by Vanadium in south-east Utah. Under terms of the tentative agreement the government-owned processing plant at Durango will be rehabilitated by the Vanadium Corporation at a cost to the company estimated to be more than $200,000. It is anticipated that ore will be supplied principally by the corporation's mines and independent operators will be able to deliver ore under the terms of the Commission's ore purchasing programme.

* * *

Another new organic compound, called "Nopol" and described as a "bicyclic primary," has been developed by the Glidden Company, Cleveland, Ohio. Produced by condensation of beta pinene and formaldehyde, the new material is now available from pilot plant operations for experimentation and development. It is said to be the only primary alcohol derived from terpenes potentially available in large quantities and at low cost.

* * *

United States production levels of industrially important inorganic chemicals for August, 1948, were generally higher than for July or for August, 1947, according to the U.S. Bureau of the Census. Increases from July, 1948, quantities were reported by the bureau for 24 of the 35 chemicals included in the continuous survey, while decreases were reported for only 11. A comparison of August, 1948, quantities with those for the same month a year ago also shows greater production for 24 and declines for 11 chemicals. Record high production was reported in August for carbon dioxide (liquid and gas, 26.9 million lb.; "dry ice," 93.8 million lb.); chlorine (142,412 short tons), hydrogen (2402 million cu. ft.), and caustic soda. Compared with the previous month's totals, production gains were also reported for such "heavy volume" chemicals as ammonium nitrate, hydrochloric acid, oxygen, phosphoric acid, the sodium phosphates, sodium sulphates, and sulphuric acid. Reductions during the month occurred for synthetic ammonia, synthetic ammonium sulphate, nitric acid, and soda ash. The relative decrease was particularly large only in the case of synthetic ammonium sulphate (July, 27.8 million lb.; August, 14.2 million lb.).

A CHEMIST'S BOOKSHELF

Molybdenum, Steels, Irons, Alloys. By R. S. Archer, J. Z. Briggs, C. M. Leeb, Jr. Published by the Climax Molybdenum Company of Europe, Ltd., London, E.C.3. Pp. 394.

Molybdenum, first isolated by Hjelm in 1790, was still classed as a rare metal in 1915. The development of the ore deposits at Climax, Colorado, from 1917, assured the iron and steel industry, for the first time, of an adequate commercial supply. By that time the use of the other alloying elements was already well established. The introduction of molybdenum often meant replacement of part or all of some of these other elements. Its acceptance by the industry therefore clearly demonstrates its metallurgical, industrial and economic value. The characteristic advantages gained from molybdenum are so marked, that today a large proportion of the world's alloy steel and cast iron production contains molybdenum as an essential ingredient. This and the growing demand for molybdenum, accentuated by war demands, confers a peculiar importance to this book.

Of its 10 sections, the first and second deal with the fundamental and technical effects of molybdenum and Section 3 describes concisely the addition of molybdenum to iron and steel, which can be made in the form of the oxide, which is easily reduced, or as ferro-molybdenum or scrap, containing the metal. Sections 4 to 7 reflect the application of molybdenum for wrought alloy engineering steels, wrought resistant steels, wrought steels for elevated temperature service and for tool steels. Section 8 deals with steel castings which can be divided into the same classifications as wrought steels. Section 9 is devoted to the extensive use of molybdenum for cast irons, divided into the three groups: grey, white and malleable, and the last section indicates a large number of special purpose and non-ferrous alloys that contain molybdenum as an essential constituent.

Molybdenum's versatility as an alloying element is nowhere better shown than in these alloys where it is widely used and contributes added corrosion resistance, elevated temperature strength, hardening, resistivity or some other desired property depending upon the type of base alloys. A good deal of the rest of the book discusses practice needs and contains a wealth of items related to the essentials of the subject.

Appendices A to L of the book are devoted to determination methods, hardening tests, tabulated chemical composition ranges, analysis and physical properties of molybdenum, etc. They make the book almost encyclopaedic, in conjunction with the abundant bibliography and references and sound hundreds of tables, diagrams and figures. The index alone covers 24 pages.

The Chemical Industry and its By-Products (Die Chemische Industrie und ihre Nebenprodukte). Third Edition. 1947. Verlag für Wirtschaftsliteratur G.m.b.H., Zürich 3, Burstwiesenstrasse 53. Pp.232.

The book is a directory of Swiss manufacturers of chemical products of commercial and purer grades. A foreword by the president of the Swiss Chemical Association outlines the scope and present development of the chemical industry, which is kept up-to-date in spite of the fact that foreign currency is short and the country is lacking in many necessary raw materials. Yet there are more than 650 firms engaged in this industrial field and the advance of the chemical industry is mainly due to new processes and new products constantly devised and developed. Recent discoveries and new applications of old knowledge are stated to be opening many new vistas. The catalogue shows that the Swiss chemical industry is keeping abreast of all developments of applied chemistry and maintains close contacts with primary research at home and abroad. The book therefore presents an accurate and complete picture of the activities and achievements of the Swiss industry. It is divided into 17 chapters classified according to the manifold products, with proprietary, trade names and trade marks. It should be of considerable help in fostering international trade relations.

Newsprint for Australia.—A deal has been arranged by Bowaters to convert into newsprint for export to Australia 25,000 cords of Canadian logs and 4500 long tons of Canadian sulphite pulp. This will make 29,500 long tons of finished paper, paid for with dollars originally allotted to purchase finished newsprint.

Home News Items

Sudanese Gum Arabic.—Only the purest gum arabic from the Sudan is used in the making of British postage stamps, states the *Post Office News Bulletin*, and almost every week there is some suggestion from the public that flavouring should be added.

Change of Address.—The Disposals Section of the Ministry of Supply Non-Ferrous Metals Directorate has moved to 66/72 Gower Street, London, W.C.2. (Telephone: MUSeum 8044.) Telegraphic address: Metrol, Westcent, London.

Canadian Metals for Britain.—Provision has been made through ECA, in Washington, for Britain, to purchase in Canada aluminium, copper, zinc and lead valued at Can. $33.4 million. Of the total authorisation for purchases of all commodities obtainable from Canada for countries participating in ERP, Britain has been allocated 89 per cent. (*Foreign Trade*, October 2.)

Two Welsh Pits to Close.—Because of the low production, the Steer and East pits at Gwaun-Cae-Gurwen collieries at Ammanford, South Wales are to be closed, and workers given a month's notice. The Wales Regional Coal Board state that since a dispute over an umpire's award on October 25, output per manshift had dropped from 11.67 cwt. to only 6.5 cwt. The two pits had lost £596,435 in the half year ended June 30.

Operational Research Club.—As a result of informal meetings at the Royal Society between those interested in the development and application of research, an Operational Research Club has now been formed. Membership is limited to retain the original nature of the meetings, but will include representatives from the operational research teams working in industrial and other civil fields, together with some from the defence services.

New Export Facilities.—Beck and Pollitzer, Ltd., shipping and forwarding agents, announce that a new export packing works, with special facilities for handling machinery, is to be opened at Bailey Road, Trafford Park Trading Estate, Manchester, on Wednesday next (October 10). The company has also extended its activities in South Africa by the formation of Beck and Pollitzer (Africa) (Pty.), Ltd., with a head office at 3 Yorkshire House, First Floor, Marshall and Rissik Streets, Johannesburg.

Viteolin Capsules.—Glaxo Laboratories, Ltd., announces that viteolin capsules are now withdrawn from the market and no further stocks are available.

Health Minister at Glaxo.—Mr. Aneurin Bevan, Minister of Health, recently visited Glaxo Laboratories, Ltd., at Greenford, Middlesex, to see streptomycin being filled and packed. He was received by Sir Harry Jephcott and other directors, and spent some time watching the drug being filled into vials ready for distribution.

Prices of Oils and Fats.—The Ministry of Food announces that the only change in the prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the four-week period ending November 27, is a reduction in the price of sunflower acid oil from £92 per ton to £58 per ton naked ex works.

Research College for Foundry Workers.—The foundry, research rooms and laboratories of the National Foundry College were opened to the Press this week. A few students have begun training, but the official opening is planned for next January. The college provides a two-year course of university standard which is the most advanced training available for the foundry industry.

Manilla Gum Copal Prices.—The Board of Trade announces that the selling prices of manilla gum copal have been reduced as from November 1. The revised prices will be as follows: L.W.S. grade, £158; Soft mixed, £138; Loba C.N.E., £120; Loba mixed, £159; Copal chips, £125. This material is administered by the Director of Sundry Materials, Board of Trade, 10 Old Jewry, London, E.C.2.

Winter Plans for Power Supply.—To meet the demands of electricity load-spreading during the coming winter nearly all the big undertakings in Liverpool have made plans for shifting times of chief demand and augmenting independent supplies. The Dunlop Rubber Company, a typical example, is confining use of some heavy plant, chiefly mixing plant, to night shift, and is bringing into operation its own diesel electric plant. One of the firm's problems is that it is still expanding. "We now employ 6,600 workers and so cannot use less electricity," it was stated by the management in Liverpool.

Personal

Six new Fellows have been elected by the Textile Institute. They are: DR. B. P. RIDGE, head of the Field Research section of Fibres Development department, Imperial Chemical Industries, Ltd., who is well-known for his work on synthetic fibres; DR. M. K. SEN, senior physicist of the Indian Jute Mills Association Research Institute, Calcutta, who studied at Leeds University in 1945, and has published considerable work on textiles both in England and India; MR. C. DIAMOND, chief technical manager (acetate and fibre processes), Courtaulds, Ltd.; MR. C. W. NORTH, strong yarn department at British Celanese, Ltd.; MR. FRANK BROCK, Isaac Holden Sons, Ltd., and MR. A. R. GEARY, principal of the Lander Technical School, Fife. MR. JOHN LAIRD HENDRY, of Durban, South Africa, now studying at Leeds University, has been elected an Associate of the institute.

A commission of three scientists to visit the Gold Coast and report on steps necessary to overcome the swollen shoot disease of cocoa trees has been appointed by the Secretary of State for the Colonies. The members are: DR. G. BARKELEY, Dominion Laboratory of Plant Pathology, Canada; DR. W. CARTER, head of the department of entomology, Pineapple Research Institute, Hawaii, and PROF. VAN SLOGTEREN, of Holland.

MR. N. L. ALLPORT has resigned from the scientific staff of The British Drug Houses, Ltd., with effect from October 29, and, as from January 1, 1949, will be taking over the practice of DR. D. C. GARRATT, consulting analyst, at 325 Kennington Road, London, S.E.11.

MR. WALTER NELLIES, O.B.E., J.P., is retiring at the end of the year from the position of general secretary of the National Union of Shale Miners and Oil Workers. He has been the Union's only secretary for 27 years.

MR. BRINLEY JONES has resigned his position as senior metallurgist in the metallurgical and research department, Vickers Works, of English Steel Corporation, Ltd., to join Climax Molybdenum Company of Europe, Ltd., as manager.

CAPTAIN JOHN MORRIS GATHERAL, who has died at Penton, Cumberland, aged 71, was formerly a chemical manufacturer on Tyneside and at Glasgow. He had been a member of Cumberland and Northumberland County and Rural Councils.

New Light-Weight Concrete

NEW light-weight types of concrete, weighing from one-sixth to one-third as much as ordinary concrete, are being developed in the U.S.A. to provide a wider range of specialised materials that may reduce domestic building costs. The U.S. National Bureau of Standards, Washington, D.C., which has been testing the new materials, says that they have two major advantages over traditional concrete: they eliminate much deadweight and provide better insulation against sound and extremes of temperature. Certain types of light-weight concrete can be sawed and nailed together like wood, it is claimed.

In the new products, various minerals—such as perlite, vermiculite, pumice, foamed slag, clay, slate and shale—are substituted for sand, gravel or crushed rock used in ordinary concrete. Officials of the bureau say that while these light-weight concretes are not strong enough for use on pavements or roadways, they have proved superior for many special construction purposes such as roofing and interior walls.

Japanese Recovery

PROSPECTS for the chemical industry in Japan show a gradual improvement and, according to recent reports, a total of nearly yen 97 million has been authorised to be borrowed or spent between four firms, for repair or improvement of their plant and production.

In research, the Japanese Institute of Scientific and Industrial Research of Osaka, established in 1939 to carry out work on problems related to industry, now has over 150 workers. Dr. T. Ao, director of the institute, recently announced the successful operation of a pilot plant for the production of ephedrine.

Other projects under consideration at the institute include: setting up of a pilot plant utilising new techniques of vacuum distillation for making vitamin A; studies on catalysts for the hydrogenation of vegetable and animal oils; the hydrogenation of paraldehyde; the synthesis of heterocyclic compounds and their derivatives, and cellulose fermentation and investigation of electrolytic condensers.

"Benzol—How It's Chlorinated" is the title of a four-page reprint now ready for free distribution by the Glyco Products Co., Inc., Brooklyn, New York. This includes a flow-sheet describing the process for making and purifying mono-, ortho- and paradichlorobenzols and hydrochloric acids.

Overseas News Items

12 Million Volts.—Massachusetts Institute of Technology announced last week the construction of a 12 million volt electrostatic generator designed to carry the science of nuclear fission into new realms.

China to Have Aluminium Industry?—Bauxite deposits which have recently been discovered in the Fukien Province of China are stated to be a valuable basis for the establishment of an aluminium industry. Before the war China imported bauxite chiefly from Indo-China, which is still the major supplier.

Dearer Lead in America.—Lead prices were raised by 2c per lb. on November 1 by the American Smelting and Refining Company and the St. Joseph Lead Company. This brought the price to a new record level of 21.50c. at New York. The Consolidated Mining and Smelting Company of Canada has also raised its lead price to 20¾c. per lb., an increase of 2c. per lb.

"Atom City" in U.S.S.R.?—A former Russian official, Mr. Kirill Alekseev, stated in an interview over the Mutual Broadcasting System of America that Russia is carrying out atomic bomb research in a city to which he referred as "Atomgrad." He claimed that a population of some 400,000 people, mostly political prisoners sentenced to forced labour, lived and worked there, mainly in underground homes and factories.

New Programme of Swiss Chemical Works.—The Holzverzuckerungs A.G., Domat/Ems, which was very active during the war, when it supplied a mixed motor fuel to replace imported petrol, refers in its report to a further reduction of this business and difficulty in keeping its plant fully occupied, which can be overcome only by the carrying out conversion to a new manufacturing programme. The most important process taken up during 1947 was production of formaldehyde supplied principally to makers of plastics.

Oil Drilling in Austria.—Reports from Austria reveal that much exploratory drilling is going on in the Zistersdorf oil field in the Vienna Basin. In addition, the French have carried out exploratory activities in the area of Lake Constance, but no results have been made public. Another recently mentioned deposit is in the U.S. zone at Taufkirchen, where daily output amounts to 250 to 500 kgs. Further deposits are believed to occur between Salzburg and the Enns River in the U.S. zone. It is also stated that oil occurs near Graz, Styria, in the British zone.

Wattle Bark Exports from S.A.—The United Kingdom was the principal recipient of large shipments of wattle bark extract made from South Africa during August. Exports of bark were also satisfactory, the chief markets being Japan, Europe and the U.S.

Malayan Bauxite Development.—The Malayan bauxite deposits, which were extensively worked during the war by the Japanese, are likely to be exploited on a large scale by British Australian and Canadian interests. Areas hitherto unexplored are being surveyed.

U.S. Rubber Consumption.—Consumption of new rubber in the U.S.A. during September was estimated at 90,214 long tons, according to the monthly report of the Rubber Manufacturers' Association, Inc., New York. This was a reduction of 2.19 per cent from the August figure. Natural rubber represented 51,400 tons, and synthetic rubber 38,814 tons.

Platinum Prospects in South Africa.—The Union Platinum Company announces that during the September quarter 2025 ft. sampled proved 100 per cent payable, with average values of 7.6 dwts platinum over 22 in., or 167 inch-dwts. The last estimate of available ore reserves gave 250,000 tons oxide ore and 89,000 tons sulphide averaging 6.3 dwts. of platinum metals per ton. The reduction plant is expected to be in operation at the end of this month.

N.Z. Wood Pulp Factory.—What is stated to be New Zealand's first wood pulp factory, at present under construction at Maraetai near Auckland, is to start operations in 1950 with an initial output of 10,000 tons per annum. The pulp is to be used both in New Zealand and in Australia for the manufacture of kraft paper. In addition, plans are under consideration for the erection of State-owned pulp plants at Murupara, near Auckland, in 1952.

Glass Commission Changes.—Decision to revise the constitution of the International Commission on Glass were made when its first post-war meeting was held recently at Sheffield and Buxton. Until the changes become effective, Prof. W. E. S. Turner and Dr. B. P. Dudding (Great Britain) are respectively president and honorary secretary, while the following countries are represented among the other members Belgium, Czechoslovakia, Denmark, France, Germany, Holland, India, Spain, Sweden and the United States.

Next Week's Events

MONDAY, NOVEMBER 8

The Chemical Society (Eire) University College, Cork. Prof. H. J. Emeléus: "Production and Uses of Radioactive Tracers."

Manchester Federation of Scientific Societies. Society of Instrument Technology. College of Technology, Manchester. 7.30 p.m. J. K. Burkitt: "A Proposed System of Instrumentation Symbols."

Hull Chemical and Engineering Society, Royal Station Hotel (joint meeting with Hull and district section of the Royal Institute of Chemistry) 7.30 p.m. J. P. Baxter: "Some Compounds of Carbon and Fluorine."

Institute of Metals (Scottish local section) Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, Glasgow. 6.30 p.m. F. E. Stokeld: "Forging and Stamping Non-Ferrous Metals."

TUESDAY, NOVEMBER 9

Chemical Engineering Group (S.C.I.). Burlington House, London, W.1. 5.30 p.m. A. D. Davidson: "Heat Transfer."

Sir Halley Stewart Trust. Memorial Hall, Farringdon Street, E.C. 6 p.m. R. F. Harrod: "The Atomic Age. III—Economic Repercussions of Atomic Power."

Textile Institute (Yorkshire section). Midland Hotel, Bradford. 7 p.m. W. H. Hillier: "The Treatment of Sewage Containing Textile Effluent."

Chemical Society of Leicester. University College. 5.30 p.m. H. J. T. Ellingham: "Chemical Affinity."

WEDNESDAY, NOVEMBER 10

Society of Chemical Industry (Food group) Conversazione, United Dairies, Ltd., Laboratories, London W.12.

The Chemical Society (Liverpool). University 4.30 p.m. Prof. M. Stacey: "The Chemistry of Some Carbohydrate Constituents of Bacteria."

Society of Dyers and Colourists (Nottingham). Victoria Station Hotel, 7 p.m. Dr. R. G. Fargher: "Recent Advances in Cotton Bleaching."

THURSDAY, NOVEMBER 11

The Royal Society, Burlington House, London, W.1. 4.30 p.m. R. M. Goody: "The Thermal Equilibrium at the Tropopause and the Temperature of the Lower Stratosphere." S. Chapman and K. K. Tschu: "The Luna Atmosphere Tide at 27 Stations Widely Distributed over the Globe."

The Chemical Society, Burlington House, London, W.1. 7 p.m. Tilden lecture: Prof. C. E. H. Bawn: "The Structure and Reactivity of Free Radicals."

Manchester Federation of Scientific Societies. Chemical Society, University, Manchester. 6.30 p.m. Reading of short papers. Pharmaceutical Society, St. Mary's Hospital. 7.45 p.m. D. G. Ardley: "Some Recent Advances in Drug Therapy."

Society of Chemical Industry (Liverpool and North-western area). University of Liverpool. 6.30 p.m. Dr. Inglis: "A Review of Steels Used in Chemical Industry."

S.C.I. (and BAC) Derby, St. James's Restaurant. 7.15 p.m. Dr. Jenkins: "Prevention of River Pollution."

FRIDAY, NOVEMBER 12

Royal Statistical Society (London group). Industrial Applications section. W. J. Jennett: "Control Charts and Associated Techniques."

Sir John Cass Technical Institute (Department of Chemistry). Jewry Street, Aldgate, E.C.3. 6 p.m. R. N. Reavell: "Lead and Its Alloys."

SATURDAY, NOVEMBER 13

British Interplanetary Society. St. Martin's School, 107 Charing Cross Road, W.C.2. 6 p.m. H. E. Ross: "Orbital Bases."

Royal Institute of Chemistry (Reading) University. 3 p.m. A symposium "Radioactive Tracer Elements."

MOLECULAR CRYSTAL GAZER

A NEW electronic research tool designed to provide molecular information about samples weighing as little as 1·28 millionths of an ounce, by investigating atomic architecture of crystal structures has been developed by engineers of the Radio Corporation of America. Called a "Molecular Crystal Gazer," the new unit is expected to find use in investigating corrosion, catalysts, lubricants, surface deposits, pigments for paints, inks and dyes, and in many other phases of metallurgy.

Technically, according to company engineers, the instrument probes the structure of crystalline substances by directing a beam of electrons through a minute specimen, producing diffraction patterns on a fluorescent plate or from a photographic print.

Italy's First Oil Pipe-Line.—Work is to commence next Spring on the construction of Italy's first oil pipe-line—from Legino, near the oil port of Vado Ligure, via Alessandria to Trecate on the east bank of the Ticino River, where Italy's largest and most up to date oil refinery is to be erected. Preparatory work is in progress on the site. The pipe-line is to be extended later to Milan, Turin and possibly to Switzerland.

New Companies Registered

Accumulator Patent Holdings, Ltd. (459,045).—Private company. Capital £3000. To acquire the rights in certain countries of the Dry Accumulator Co., Ltd. and Edmund W. Sudlow and Leonard Fuller in certain inventions relating to electrical accumulators; and to act as manufacturers of electrical accumulators, batteries, acids and containers, etc. Directors: Edmund W. Sudlow and Dr. Hugh C. Fuller. Solicitors: Gouldens, 16 Byward Street, E.C.3.

Alkyl Aryl Chemicals Ltd. (459,975).—Private company. Capital £100. Manufacturers of chemicals and manures, etc. Directors: J. F. O'Brien and E. Biddlecombe, Solrs.: Linklaters & Paines, 6 Austin Friars, E.C.2.

Chemical Engineers (Glasgow), Ltd. (26,604).—Private company. Capital £2000. Manufacturers of chemical, engineering, scientific and surgical machinery and instruments. Subscribers: H. Winning, Jr., The Croft, Kilmacolm, Renfrewshire, and S. A. J. Murray. Reg. office: 31 Townsend Street, Glasgow, C.4.

F. D. Copeland & Sons, Ltd. (460,389).—Private company. Capital £1000. To acquire the business of importers and exporters of all natural essential oils carried on by F. D. Copeland & Sons, 275 Baring Road, S.E.12. Directors: F. D. Copeland, Mrs. Copeland, and R. C. Wilkie. Reg. office: 275 Baring Road, Grove Park, S.E.12.

Crystal-Brite Products, Ltd. (460,430).—Private company. Capital £1000. Manufacturers of abrasives, detergents, oils, chemicals, etc. Directors: A. W. Ayres, Mrs. W. R. Ayres, and D. H. Norris. Reg. office: 32 Great Windmill Street, W.1.

East Anglia Plastics, Ltd. (459,738).—Private company. Capital £20,000. To acquire the business of manufacturers of and dealers in plastic materials carried on at Darlington by East Anglia Chemical Co., Ltd. Directors: T. C. Usher (director of East Anglia Chemical Co., Ltd.) and C. G. Moore. Reg. office: Street One, Aycliffe, Darlington.

Elcontrol, Ltd. (460,270).—Private company. Capital £3000. Manufacturers of electro-mechanical recording and controlling devices. Reg. office: The Clock House, 7 Arundel Street, W.C.2.

Enesco Scientific Glassware, Ltd. (460,386). Private company. Capital £500. Laboratory furnishers and proprietors, chemical engineers, etc. Directors: J. A. Davis, 12 High Street, Penge, S.E.20; and A. F. M. Batchelor.

Midland Direct Supplies (1948), Ltd. (460,218).—Private company. Capital £3000. Objects: To acquire the business of Notts. Direct Distributors, Ltd., and Midland Direct Supplies, Ltd. Manufacturers of chemicals, gases, oils, etc. Directors: J. P. Shaw, Ada Shaw, R. Blackmore and G. Smith. Reg. office: 17 Village Street, Derby.

Southern Humus, Ltd. (460,312).—Private company. Capital £1000. Manufacturers of manures, fertilisers, chemicals, gases, etc. Directors: B. P. Cook, and S. Marian. Reg. office: 8 The Drive, Hove, 3.

Company News

Societa Anonima Italiana Ciba, Milan, the Italian subsidiary of Ciba, Ltd., (pharmaceutical products, chemicals and dyestuffs) has increased its share capital from 6 to 200 million lire.

Chemical and Allied Stocks and Shares

INTERNATIONAL news, the U.S. elections and implications of the Steel Bill have all made for caution in stock markets. Iron and steel shares provided the only really active section, and generally prices have been quite well maintained on balance in the absence of selling. The City regards as extremely unfair that take-over values for iron and steel nationalisation are based on share prices and not assets values of the companies.

The nationalisation threat, dividend limitation and the Bonus Tax have all combined since the war to keep down share prices. Compensation based on assets values would have taken a long while to assess, and because of this share prices are being taken as the yardstick in the hope that it may be possible to effect the "take-over" of the industry by May 1, 1950. The Government then plans to exchange shares into British Steel stock on the basis of the take-over prices of individual shares and the values then ruling for British Funds.

Steel shares are now, in effect, a means of acquiring a long-term interest in British Funds, and as such may tend to attract a good deal of attention. Their estimated take-over values will mean that there is very little danger of a fall in market values below current levels.

Current market values are mostly slightly below take-over prices, due to the fact that

buyers naturally have to pay the usual stamp and brokerage expenses. In some instances prices are well below take-over, but this is only temporary and arises from the fact that there has been selling of some shares which recently attracted a good deal of buying on the hope that nationalisation "compensation" would be made on an assets value basis.

Staveley shares, for instance, are quoted at 88s. 9d. at the time of writing, although the "take-over" is 90s. 8d. Indeed, there was considerable surprise that not only the Staveley company itself, but also its subsidiary, the Staveley Iron & Chemical Company, are to be absorbed.

A feature has been a general rise in shares of iron, steel and allied companies not being taken over, notably Vickers, Cammell Laird, Baldwins, and John Brown. English Steel Corporation (controlled by Vickers and Cammell Laird) is being taken over, but the shares not being quoted, their valuation for this purpose will be a matter of arbitration.

There has been some switching from iron and steels into leading industrials, but so far this has not been sufficient to affect prices. Leading chemical shares have been relatively firm with Imperial Chemical at 47s. 7½d., Monsanto Chemicals 60s., Laporte 5s. units 21s. 6d., Fisons 59s., W. J. Bush 82s. 6d., Albright & Wilson 5s. ordinary 30s. 3d., and Amber Chemical 2s. shares 9s. 6d. The 4s. units of the Distillers Co. were 28s. 7½d., British Plaster Board rallied moderately to 22s. 6d., Glaxo Laboratories were £18¼ and Turner & Newall changed hands around 77s. 6d., United Molasses have been steady at 47s. 9d., and Tube Investments at £6⅜ were little changed, although there was general satisfaction that the latter company is not to be nationalised. Stewarts & Lloyds, however, is scheduled for nationalisation and the deferred units are quoted at 56s. 9d. at the time of writing, compared with the estimated take-over value of 57s. 4d.

Elsewhere, British Glues & Chemicals 4s. shares were 20s., British Oxygen firmed up to £5, Borax Consolidated were 63s. and British Aluminium 47s. 6d. Boots Drug remained firm at 55s., British Drug 5s. ordinary were 9s. 3d., but, following full details of the Anglo-Dutch tax agreement, Lever N.V. came back to 51s. 3d. although Lever & Unilever firmed up to 50s. 6d. Oils receded, Anglo-Iranian to £8⅛ and Burmah Oil to 70s. 7½d., while Shell were 75s. 7½d. and, awaiting the results, Trinidad Leaseholds 5s. units were 31s. 4½d.

British Chemical Prices

Market Reports

FIRM price conditions operate in most sections of the industrial chemicals market and the demand generally is sustained at recent levels. There has been little alteration in the supply position which, on the whole, is reasonably satisfactory in view of the high rate of intake of the home consuming industries. Inquiries for export continue on a fairly substantial scale and items prominent in this respect are disinfectants, dyestuffs and fine chemicals. Among the soda products there has been an active market for caustic soda, both for home and export, chlorate of soda, sulphide of soda and yellow prussiate of soda. All the potash chemicals are finding ready buyers at firm rates. The call for the red and white leads remains strong at the recently increased prices. Formaldehyde is in good demand and acetic acid supplies are fully absorbed at controlled rates. A steady market characterises the trade in coal tar products and the demand for both home and overseas destinations remains more or less unchanged.

MANCHESTER.—The chemical market has continued active during the past week from the point of view of home-trade deliveries, and specifications against orders already placed are circulating freely. Replacement buying from the textile and allied trades has also been on steady lines, and new business on account of other industrial users has been on a fair scale. A fair number of inquiries for shippers have been reported during the past few days, covering a wide range of products. There is a steady demand for the leading fertiliser materials, and in the tar products market a ready outlet is being found for most of the leading classes, light and heavy.

GLASGOW.—The increased turnover noted during the past few weeks continued last week in the Scottish chemical market. Demand was widely distributed, all industrial chemicals having been fairly well absorbed, and demands were fully met. The main shortage has been calcium chloride, and this shortage is likely to be accentuated during the coming winter months. It has been very noticeable that the artificial demand for light soda ash which was created when the material was being rationed has disappeared since the rationing finished some weeks ago. In the export market there has been a temporary loss of orders from the Argentine, due to the Argentinian exchange permit position; otherwise conditions are unchanged.

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Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2. at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Regeneration of contact particles.—J. C. Arnold. (Standard Oil Development Co.) April 10, 1945. 608,859.

Plasticised compositions and process for preparing the same.—Firestone Tyre & Rubber Co. April 1, 1944. 608,947.

Electrolytic recording electrode.—Faximile, Inc. Sept. 11, 1941. 608,953.

Polymerisation of organo-siloxanes.—Corning Glass Works. Oct. 3, 1944. 608,955.

Organo-silicon compositions and methods of making them.—Corning Glass Works. Oct. 3, 1944. 608,956.

Weld rods for depositing hard metallic layers on the surface of metallic pieces.—Soc. d'Electro-Chimie,- d'Electro-Metallurgie et des Acieries Electriques d'Ugine. Oct. 8, 1943. 608,957.

Installation and process for treating dust-containing mixtures of substances of different densities.—F. Poitte. July 1, 1944. 609,029.

Sintered bodies for direct welding to metal parts.—Brown, Boveri & Cie, A.G. Oct. 5, 1944. 609,030.

Apparatus for projecting thermal or visible or ultraviolet radiation.—G. Roth. Sept. 21, 1945. 608,864.

Cyanine dyes containing a carbonyl or thiocarbonyl substituent in the methine-chain and photographic silver halide emulsions sensitised therewith.—General Aniline & Film Corporation. Oct. 17, 1944. 609,033.

Pressure-welding process and articles produced thereby.—Soc. Anon. Tubix. Nov. 21, 1944. 609,035.

Process and apparatus for dividing a liquid.—De Directie Van de Staatsmijnen in Limberg. Dec. 23, 1943. 608,876.

Manufacture of azo dyestuffs capable of being chromed.—J. R. Geigy A.G. Dec. 21, 1944. 609,039.

Aqueous non-alcoholic vanillin-containing flavoured composition.—Salvo Chemical Corporation. Jan. 25, 1945. 608,771.

Detection of suspended matter in fluids.—Specialities Development Corporation. Dec. 23, 1944. 608,772.

Process for the production of condensation products from 1 : 8-naphthosultone, and the resulting products.—J. R. Geigy A.G. Dec. 12, 1944. 609,040.

Apparatus for crimping or corrugating strip or sheet material.—I.C.I., Ltd., and A. F. Dyson. Dec. 21, 1945. 608,775.

Valve device for heating and/or ventilating purposes.—I.C.I., Ltd., and R. W. Sturges. Jan. 16, 1946. 608,968.

Thermostatic electric control devices.—Wilcolator Co. March 15, 1944. 608,879.

Mechanisms for applying liquids to sheets.—Block & Anderson, Ltd., and H. Gerlach. Jan. 28, 1946. 608,785.

Process for the stabilisation of hydrogen cyanide.—A. Sporzynski. Feb. 11, 1946. 608,885.

Oxygen cutting-machines.—L. J. Hancock, and W. F. Cumber. Feb. 12, 1946. 608,886.

Process for pasting halogen-containing polymerisation products on surfaces.—N.V. De Bataafsche Petroleum Maatschappij. May 2, 1945. 608,893.

Manufacture of tris-azo-dystuffs.—Ciba, Ltd. Feb. 27, 1945. 608,897.

Basic refractory products, in particular, basic refractory linings for furnaces and parts of furnaces, and a process for obtaining them.—Commentary Fourchambault et Decazeville. Feb. 19, 1943. 608,790.

Electrolytic production of light metals.—E. I. Du Pont de Nemours & Co. March 1, 1945. 608,805.

Production of chlorinated trimethyl acetonitrile.—E. I. Du Pont de Nemours & Co. March 2, 1945. 608,806.

Copolymers of halogenated ethylenes.—E. I. Du Pont de Nemours & Co. March 1, 1945. 608,807.

Sealing devices for centrifugal separators.—A/B Separator. March 2, 1945. 608,808.

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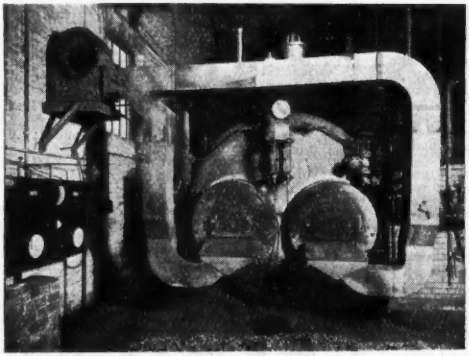

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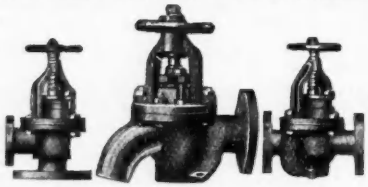

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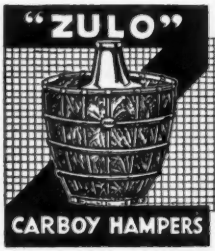

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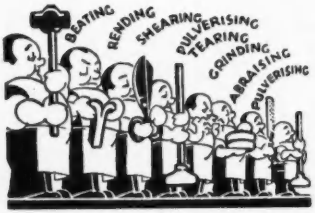

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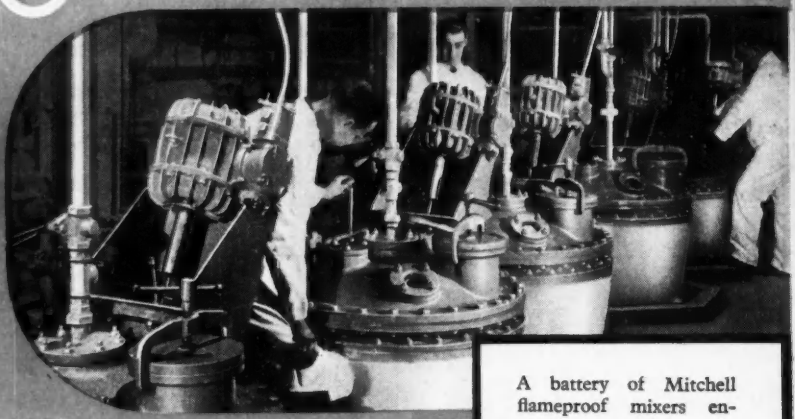

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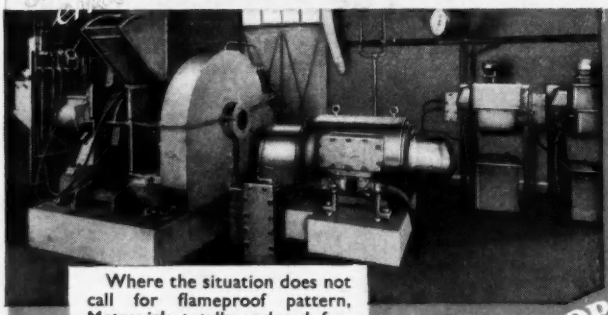

Left: A Metrovick 40 hp. flameproof motor driving Banbury mixer at a large paint works in the Midlands. The control gear is also of the Metrovick flameproof pattern.

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